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Stored Radioactive Material Landfill Site #7 (LF-7), Massachusetts Military Reservation, Cape Cod, MA

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Maj Marcus Grant, Maj Alan Hale

5d. PROJECT NUMBER

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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

USAF School of Aerospace Medicine
Occupational and Environmental Health Dept/OECM
2510 Fifth St.
Wright-Patterson AFB, OH 45433-7913

8. PERFORMING ORGANIZATION REPORT NUMBER

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13. SUPPLEMENTARY NOTES

14. ABSTRACT

A scoping survey was performed 9-13 Jul 2012 at the stored radioactive material landfill site (LF-7) on Camp Edwards, Massachusetts Military Reservation, Cape Cod, MA. Walkover surveillance and environmental sampling were used to characterize any radioactive material presence at the LF-7 site. No observable or detected evidence of radioactive material contamination was identified.

15. SUBJECT TERMS

Camp Edwards, Massachusetts Military Reservation (MMR), Landfill Site, LF-7, MARSSIM, Scoping Survey

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			TSgt Samuel Ortiz
U	U	U	SAR	107	19b. TELEPHONE NUMBER *(include area code)*

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

DEPARTMENT OF THE AIR FORCE
USAF SCHOOL OF AEROSPACE MEDICINE (AFMC)
WRIGHT-PATTERSON AFB OH

7 March 2013

MEMORANDUM FOR HQ USAF/SGE
AFMSA/SG3PB
7700 ARLINGTON BLVD
FALLS CHURCH, VA 22042-2902

FROM: USAFSAM/OEC
2510 Fifth Street
Wright-Patterson AFB, OH 45433-7913

SUBJECT: Consultative Letter, AFRL-SA-WP-CL-2013-0003, Stored Radioactive Material Landfill Site #7 (LF-7), Massachusetts Military Reservation, Cape Cod, MA

1. INTRODUCTION:

a. *Purpose:* At the request of your office, the Consultative Services Division of the United States Air Force School of Aerospace Medicine (USAFSAM/OEC) completed a radiation scoping survey of the stored radioactive material landfill site (LF-7), Camp Edwards, Massachusetts Military Reservation (MMR), Cape Cod, MA, during 9-13 July 2012. This letter provides results from land surface scans and environmental samples in efforts to determine the presence of radioactive material contamination at the site. The environmental sampling analysis was compared to Derived Concentration Guideline Limits (DCGLs), where the DCGLs were set at the Nuclear Regulatory Commission's (NRC) screening levels. The results from this survey will be used as a basis of information for future decisions to perform additional investigations and/or remediation of the site (if applicable) and to evaluate potential health hazards to hypothetical future site residents.

b. *Survey Personnel:*

(1) Maj Marcus Grant, Health Physics Consultant, USAFSAM/OEC
(2) TSgt Samuel Ortiz, Health Physics Technician, USAFSAM/OEC
(3) SSgt Michael Ames, Health Physics Technician, USAFSAM/OEC

c. *Personnel Contacted*:

(1) Jonathan S. Davis, P.E., Remediation Program Manager, AFCEE/EXE/MMR
(2) Rose Forbes, P.E., Project Manager, AFCEE/EXE/MMR

d. *Equipment (see Attachment 1)*:

(1) Radiation Solutions, Inc, RS-700, SN 7033/NaI SN 515, Calibrated: 29 Jun 12
(2) Ludlum Model 44-10 Gamma Detector w/Ludlum Model 2221 Meter, SN Meter: 169220, NaI: PR276618, Calibrated: 28 Nov 11
(3) Ludlum Model 44-10 Gamma Detector w/Ludlum Model 2221 Meter, SN Meter: 218606, NaI: PR276614, Calibrated: 23 Nov 11
(4) Bicron Surveyor M Pressurized Geiger Mueller (PGM), SN A117N, Calibrated: 14 Sep 11

2. METHODOLOGY: To confirm the existence of radioactive materials stored in the past, a Multi-Agency Radiation Survey and Site Investigation (MARSSIM)-type scoping survey was recommended to identify levels of radiation at sensitive levels and beyond the capabilities of the local Bioenvironmental Engineering office. For additional details about previous assessments, methodologies, and findings, please refer to Attachment 2, LF-7 Decision Document and Historical Site Information.

a. *Background*: The background area chosen includes a statistically significant summation of both the LF-7 site and hilltop area to represent the total summed area surveyed at the site (50- by 50-ft area). The area was chosen because the site had similar representation of both the grass and soil at the LF-7 site, it was not impacted from site operations, and it was close to the LF-7 site. The surface area was characterized utilizing two 2x2 sodium iodide (NaI) detectors using a gamma walkover technique, one RS-700 for both in-situ static and walkover scans, three graded soil samples, and one vegetation sample. Scan coverage was effectively 100%. Surface measurements, in-situ measurements, and soil and vegetation samples were taken to establish baseline naturally occurring radioactive material (NORM) levels near the sample site for use in determining action levels. The background area is located at 41.678372° N and 70.547919° W (see Attachment 3 for location of LF-7 site and background areas).

b. *Survey*: For initial screening purposes, the goals of the walkover survey were to detail radiological conditions, identify potential spots of elevated residual radioactive contaminants, and identify locations for biased soil sampling. Based on the historical information regarding the presence of residual radioactive contamination, the team conducted general gamma scanning, in-situ techniques, and random environmental sampling of the 400-ft^2 site and perimeter surrounding the site. The site was scanned utilizing the scanning capability of the Ludlum 2221 meter mated with a 2x2 NaI detector in efforts to find elevated areas of gamma radiation. Due to the high levels of uncertainty of the suspected burial site, an adjacent cleared area (hilltop) was also surveyed in conjunction with the LF-7 site. The team looked for areas that exceeded the predetermined action level based on the initial background scans for decision points. If action levels of two times background levels were exceeded, further investigation of the site via static in-situ detection and biased environmental samples was undertaken. The LF-7 site is located at 41.677653° N and 70.547489° W and the hilltop site is located at 41.677615° N and 70.547464° W.

c. *In-Situ Scan*: Additional static and walkover scans were conducted utilizing the RS-700 Mobile Monitoring System and the Ortec Detective EX (High-Purity Germanium) detector to identify the presence of Cs-137, Co-60, Ra-226, or any other gamma-emitting radioisotopes. Four-hour static scans were taken with the RS-700 at the LF-7 site, hilltop, and background areas. The team also analyzed six random soil sampling boring holes by placing the Ortec Detective EX inside the bore holes for a minimum of 30 minutes (see Attachment 4 for spectra and Attachment 5 for pictures of Ortec Detective setup).

d. *Vegetation Sampling*: Although vegetation is not routinely obtained for analyses, the survey team deemed it necessary to collect vegetation to rule out food chain contamination for future use. Several kilograms of vegetation were taken to ensure sensitivities could be met for H-3 and Ni-63. Vegetation growing on contaminated soil was sampled by harvesting two 1-m^2 sod pieces at the sample site and one in the background. Each sample met the USAFSAM Radioanalytical Laboratory's minimum vegetation sample requirement of 3 liters each and was densely packed by double packing into a 1-gal ziplock bag. All vegetation samples were prepared, packaged, and sent for analysis at GEL Laboratories.

e. *Soil Sampling*: Soil samples were taken inside the fenced area, immediately outside the fenced area, and in both background areas near the fenced area to address the immediate concern for surface contamination. There were 48 random soil samples taken utilizing a graded, nonbiased, random-start, triangular grid pattern (Attachment 5) at depths of .5 ft, 1 ft, and 2 ft within a 9-in^2 area. Soil excavation for sampling was accomplished utilizing both a manual and powered truck-mounted auger. The samples were weighed utilizing a field scale and visually inspected for radioactive parts and scanned for radioactive particulates utilizing a Bicron PGM. Borehole samples were collected from the center of each grid marker. Additionally, 18 6-ft composites were taken for additional confidence in determining general presence of radioactive contamination in the soil. Each borehole sample will be assumed to adequately represent the radiological status in the grid location of 1 m^2, while each section of the borehole sample represents the particular soil stratum in that grid block. The choice of soil profile depths using the manual and powered truck mounted auger were based on numerous factors. Most notably the decision to obtain 6-ft depths for composite samples taken with the large powered truck auger. At a depth of 6 ft within each of the 18 composite locations, the auger bit encountered heavy resistance from an unknown source. To remain within the scope of the survey, the decision was made to continue at a depth of no more than 6 ft and obtain representative soil samples at this depth. The total amount of soil excavated for sampling was approximately 100 kg, which is represented by (200 ft^2 + 400 ft^2) x 2 ft = 1200 ft^3. All soil samples were prepared, packaged, and sent for analysis at GEL Laboratories.

f. *Laboratory Analysis*. Three laboratory methods were planned for sample analysis. In general, all soil and vegetation samples collected were sent for offsite laboratory analysis. Samples sent for offsite radiological analysis were analyzed by gamma spectroscopy, proportional counting, and liquid scintillation counting. All identified and unidentified peaks were reviewed for validity. Samples were analyzed by GEL Laboratories, with approximate minimal detectable concentration (MDC) values listed in the Certificate of Analysis for the radioisotopes of concern (Attachment 6). This value was established as at least 10% of the DCGL for increased statistical confidence. The MARSSIM recommends that the MDC of field

and laboratory instruments used be 10%-50% of the DCGL. All soil and vegetation samples were prepared by drying, grinding, and weighing in accordance with the analytical facility's approved procedures (USAFSAM Radioanalytical Lab). The radiological data are reported as pCi/g dry weight along with estimated total propagated uncertainty and MDC in pCi/g dry weight to compare to current DCGLs.

g. *Cross-Contamination Prevention*: The as-low-as-reasonably-achievable concept was applied to the remediation of soils, contaminated areas, and any efforts to remove minimally contaminated electron tubes on the site. Latex gloves were used to minimize cross-contamination potential. Floor contact surfaces like boots, knees, and hands were frisked with the Bicron PGM and associated meter to evaluate contamination levels. No level of personal protective equipment was required after it was determined that there was no initial evidence of contamination from the first scan. The sampling tools used were cleaned with a 5% bleach solution at a temporary decontamination tarp constructed immediately outside the fenced area.

3. RESULTS:

a. *Ludlum 2221 NaI (2x2) Scan Results (Table 1) [in counts per minute (cpm)]:*

Table 1. *Ludlum 2221 NaI (2x2) Scan Results*

Result	Background Area	Survey Area
Minimum Count	1046	1055
Maximum Count	13635	14816
Mean	8240	11028
Standard Deviation	2097	1466

b. *RS-700 Scan Results (Table 2) [in gammas per second (gps)]*:

Table 2. *RS-700 Scan Results*

Result	Background Area	Survey Area
Minimum Count	2853	2703
Maximum Count	3346	3674
Mean	3108	3421
Standard Deviation	56	138

c. *Ortec Detective EX Results:* The average spectrum was indistinguishable from background (Attachment 4).

d. *Laboratory Results:* Below in Table 3 is a summary of the laboratory results for the soil and vegetation results; see Attachments 4, 7, and 8 for additional substantiating data. Values were rounded to the nearest hundredth or thousandth as appropriate. Note that while there was no cleanup goal since this was a scoping survey, DCGLs were assumed for soil and vegetation. These DCGLs were set at the NRC soil screening levels for data analysis and health risk assessment purposes.

Table 3. *Laboratory Results Summary*

Isotope	Assumed DCGL (pCi/g)	Maximum Gross Soil Result (pCi/g)	Mean Soil Background (pCi/g)	Maximum Gross Vegetation Result (pCi/g)	Vegetation Background (pCi/g)
Gross Alpha	n/a	25.10	12.54	24.70	6.29
Gross Beta	n/a	36.60	24.63	27.20	8.50
Cs-137	11.000	0.360	0.096	0.317	0.008
Co-60	3.800	0.055	0.018	0.034	0.048
H-3	110.00	2.40	1.24	0.89	2.17
Ni-63	2100.00	1.45	0.22	0.70	0.03
Ra-226	0.70	1.44	0.77	1.06	0.00

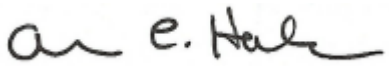
e. *Laboratory Results Discussion:* Results of soil and vegetation samples by radionuclide of concern were consistent. The highest gross soil or vegetation level for Cs-137, Co-60, H-3, and Ni-63 was less than 4%, 2%, 3%, and 1% of their DCGL, respectively. Due to the low levels of Cs-137, Co-60, H-3, and Ni-63, these radionuclides may not warrant further investigation. The highest gross soil level for Ra-226 was approximately twice the DCGL; however, after subtracting the mean background, the net level was approximately 95% of the DCGL. The highest gross vegetation level for Ra-226 was approximately 150% of the DCGL. With limited samples and background data, and the limitations inherent to this scoping survey, the absence of Ra-226 at this site cannot be justifiably ascertained. Statistical analysis cannot be performed to determine a conclusive absence of net Ra-226 levels above the DCGL, due to the limited number of background data points. To make a final determination of the absence of Ra-226, further investigation should be performed. Or if a site-specific Ra-226 DCGL is determined to be greater than the screening level of 0.70 pCi/g, further investigation may not be necessary.

4. RECOMMENDATIONS AND CONCLUSIONS:

a. No levels of radioactive material were found during the scoping survey that indicate widespread high levels of contamination or contamination that poses an immediate threat to the environment and personnel. The levels of Cs-137, Co-60, H-3, and Ni-63 were all well below screening levels and indicate that there is no contamination from these radionuclides. The levels of Ra-226 did not conclusively rule out radium levels above the DCGL. Therefore, to make a final determination of the absence of Ra-226, further investigation should be performed that may include a site-specific Ra-226 DCGL to determine if the conservative screening level of 0.70 pCi/g is appropriate. Moreover, due to the limitations of the scoping survey of limited soil sampling and scanning, it is possible items or materials containing radioactive material may be buried in the landfill. No metal fragments contaminated with radioactive material were detected on or within the soil during this survey.

b. Based upon the results of this scoping survey, USAFSAM recommends that the AF Regulatory Agency, Radioisotope Committee Secretariat (RICS) develop a way forward for the LF-7 landfill. The RICS should recommend a more comprehensive contractor-led characterization/final status survey of the site or issue guidance that in the event of LF-7 landfill remediation, radiological screening on excavated material prior to final disposition and a survey of the remediated landfill prior to backfilling are required.

5. If you have any further questions regarding this report, please contact Maj Alan Hale at DSN 798-3320 or alan.hale@us.af.mil. Please direct any questions or comments regarding the Consultative Services Division's support to Lt Col David Sonntag at DSN 798-3328 or david.sonntag@wpafb.af.mil.



ALAN C. HALE, Maj, USAF, BSC
Chief, Radiation Health Consulting Branch

8 Attachments:
1. Equipment
2. LF-7 Decision Document and Historical Site Information
3. Survey of Background Area
4. Survey of LF-7 Area
5. Equipment Calibration Certificates
6. Pictures
7. Environmental Sample Laboratory Results and Sample Locations
8. Laboratory Results

Attachment 1

Equipment

Instruments

Table 1.1 contains a listing of instruments used for the survey work and associated details. Instruments were calibrated by USAFSAM prior to field work and during the course of the scoping survey. All instruments used had daily response checks and background radiation assessments.

Table 1.1. Equipment

Description	Serial Number	Instrument	Survey Task (s)	Sensitivity
RS-700 (Radiation Solutions, Inc.)	PN: RS-701 SN: 7033 Detector: PN: RSX-1 SN: 5153	Mobile Monitoring System w/one 26.8" x 6.4" x 6.8" NaI (Tl) scintillator detector mated with 1024 advanced digital spectrometer and built-in GPS	Radiological scans of land areas	Photon-emitting radionuclides
2- Ludlum Model 44-10 Gamma Detectors w/Ludlum Model 2221 Meters	Meter SN: 169220 NaI SN: PR276618 Meter SN: 218606 NaI SN: PR276614	Single channel analyzer scalar/ratemeter w/ 5.-1 x 5.1- cm-thick (2" x 2") (Dia x L) NaI (Tl) scintillator	Radiological scans of land areas inaccessible by mobile systems (low-level, wide-energy gamma detection)	Sensitivity: Typically 900 cpm/μR/h (137Cs gamma) Background: 9750 cpm Recommended energy range: 50 KeV–3.0 MeV Ideal for Cs-137 and Co-60
Ortec Detective EX, Hyperpure Germanium (HpGe) Detection System	PN: Model Micro SN: 09477294	High-resolution gamma spectroscopy and identification Contains a crystal nominal dimension of 50 mm diameter x 30 mm deep, P-type high-purity germanium; coaxial construction Scalar/ratemeter mated to large area dual phosphor scintillators	Radioisotope scanning, search, and identification	(~20 to 100 times better than NaI detectors); two detectors determine the gamma dose rate over a wide range from < 0.05 μR/h to > 500 μSv/h
Bicron Surveyor M (PGM)	SN:A117N	Portable count rate meter used for detection and measurement of ionizing radiation mated w/GM probe	Assessment of surface contamination, isolated contamination in soils and parts	Alpha and beta particles, photons, and B-Particles w/B-window open (0-1M cpm)

1. The Ludlum 2221 meter utilizing a 2x2 NaI crystal was used to monitor all areas for gamma radiation. Operational checks consisted of conducting daily 1-min scalar counts measuring a Cs-137 check source to verify any shifts due to voltage or physical damage. Daily checks also included battery voltage checks and physical inspection of the cable for wear, cracks, or damage. Also, the audio, display screen, lamp, and all switches and knobs were checked.

2. The Ortec Detective EX and RS-700 were used to monitor the background areas and areas outside the fence. Ortec Detective EX calibration consisted of nightly operational checks with a (10-μCi) Cs-137 check source. Physical inspection included verifying that the cooler was operating and battery was charged each morning. The RS-700 was calibrated with natural thorium and a (10-μCi) Cs-137 source on the first day of sampling. According to the manufacturer, gain stabilization is accomplished using natural uranium, thorium, and potassium when necessary. The team also performed operational checks utilizing Co-60 prior to field work and during the scoping survey.

3. A Bicron PGM was used to identify gross levels of elevated radioactivity and to frisk survey personnel and equipment prior to, during, and after sampling in all areas. Function checks were accomplished utilizing a Cs-137 (10-μCi) source.

4. A power and hand auger, sift, trowel, decontamination tarp, deionized water, and a 5% bleach solution were used for soil sampling.

Attachment 2

LF-7 Decision Document and Historical Site Information

INSTALLATION RESTORATION PROGRAM

DECISION DOCUMENT
RADAR TUBE BURIAL LANDFILL
(LF-7 STUDY AREA)

MASSACHUSETTS MILITARY RESERVATION
CAPE COD, MASSACHUSETTS

FINAL
NOVEMBER 1993

Hazardous Waste Remedial Actions Program
Oak Ridge K-25 Site

INSTALLATION RESTORATION PROGRAM

DECISION DOCUMENT
RADAR TUBE BURIAL LANDFILL
(LF-7 STUDY AREA)

MASSACHUSETTS MILITARY RESERVATION
CAPE COD, MASSACHUSETTS

FINAL

Prepared for:

Hazardous Waste Remedial Actions Program
Oak Ridge, Tennessee

Managed by:

Martin Marietta Energy Systems, Inc.
for the
U.S. Department of Energy
Under Contract No. DE-AC05-840R21400

Prepared by:

ABB Environmental Services, Inc.
Portland, Maine
Project No. 07030-05

NOVEMBER 1993

DECISION DOCUMENT
RADAR TUBE BURIAL LANDFILL
(LF-7 STUDY AREA)

MASSACHUSETTS MILITARY RESERVATION

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LIST OF FIGURES

1.0 STUDY AREA DESCRIPTION

Study Area LF-7 is located in a gravel pit north of the present sanitary landfill (see Figure 1). It is an area where radioactive electron tubes, removed from EC-121 aircraft radar sets, were reportedly buried. Since approximately 200 tubes/year were removed from aircraft between 1955 and 1970, it is estimated that as many as 3,000 tubes may be buried. In response to discussions with the USEPA on May 19, 1992, the ANG investigated the nature of the radioactive isotopes used in the radar tubes disposed at LF-7. ANG and USAF radiation safety officers and bioenvironmental engineering staff (Attachment A) were consulted on the nature of the radioactive isotopes used in the electron tubes. However, the stock number of the radar units in which the tubes were installed could not be positively identified. Therefore, the exact isotope identification could not be established.

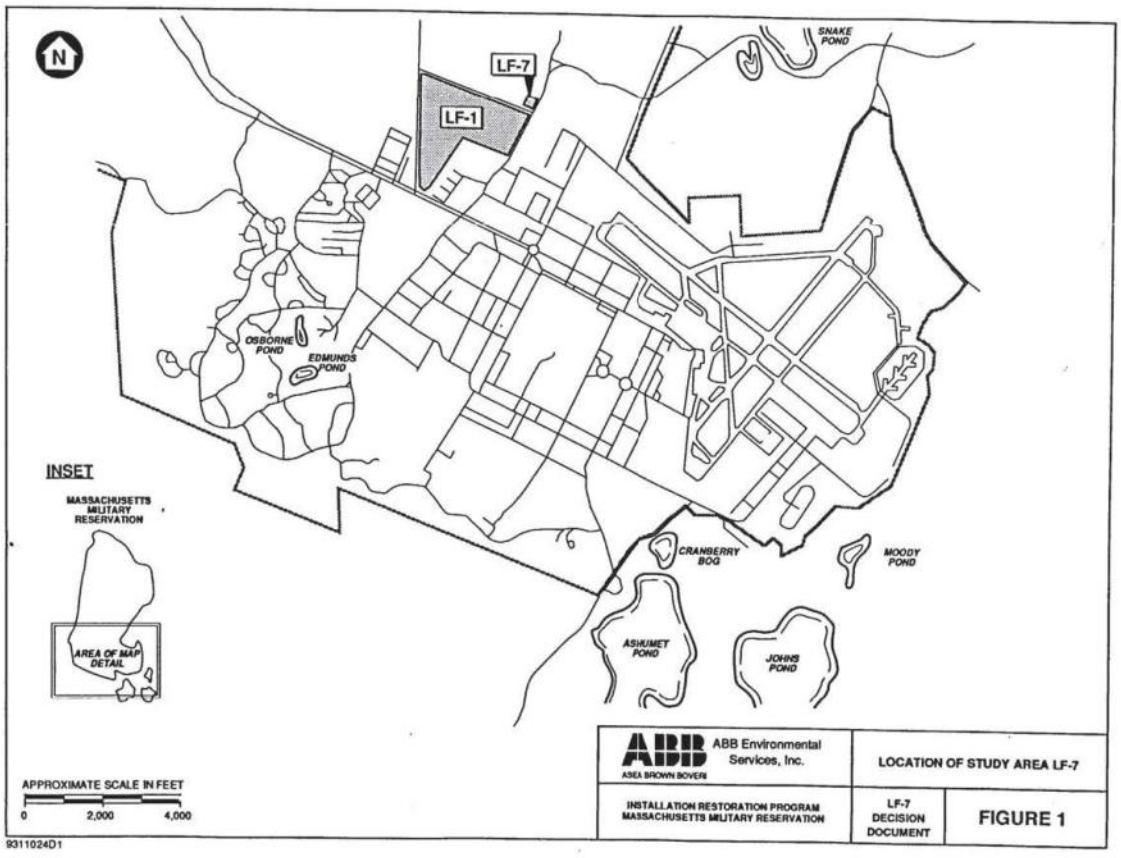
Based on discussions with ANG and USAF personnel, the most likely radioactive isotopes used in the electron tubes were: Cesium-137, Tritium, Nickel-63, Cobalt-60, and Radium-226. It is also possible that other isotopes were used, since the electron tube manufacturers were required to meet certain performance specifications, but the radioactive isotope used in each tube was not specified.

These tubes are believed to have contained very low, near background, levels of radioactive material ranging from 10^{-7} to 10^{-9} picoCuries (pCi). Using the estimated number of tubes and their pCi range, the total radioactivity at this study area is calculated to be $3x10^{-4}$ to $3x10^{-6}$ pCi. If this entire amount of radioactivity were contained in one (1) liter of water, the level of radioactivity would be, at worst, $3x10^{-4}$ pCi/L. The United States Environmental Protection Agency (USEPA) Interim Primary Drinking Water Standards for radium and gross Alpha radioactivity are 5 pCi/L and 15 pCi/L, respectively. The worst-case concentrations calculated above are negligible compared to federal standards. Actual concentrations maybe considerably lower than the worst-case scenario calculation.

Because of the uncertainty in the identification of the isotope(s) disposed at LF-7, specific discussions regarding the radioactive half-life(s) cannot be made. The half-lives of the likely isotopes used in the radar electron tubes extend from approximately 5 to 1,620 years (Attachment B). Therefore, the radioactivity in these tubes, which were disposed between 1955 and 1970, is calculated to range from less than 1 percent to 100 percent of that present when the tubes were initially disposed.

Three annual monitoring events have been conducted to date. The results are presented in letters contained in Attachment C. LF-7 encompasses an area approximately 20-foot by 20-foot; monitoring covers the entire area of the site.

Radiological assessment of tube burials at other USAF study areas, performed as part of the overall USAF Installation Restoration Program (IRP), has not reported radiological contaminant migration or human health hazards in association with such study areas.



2.0 INSTITUTIONAL CONTROLS

Study Area LF-7 will be operated in full accordance with AFOMS/SGPR policy letter of August 9, 1988. This policy specifies that areas used for disposal of low-level radioactive wastes will be appropriately fenced to prevent unauthorized entry, marked with appropriate radioactive warning labels, and monitored annually to verify that actual levels of radioactivity remain acceptable. In addition to the fencing surrounding the disposal site, and in response to USEPA concerns, an area surrounding LF-7 will be posted by the ANG to prevent excavation. The area to be posted will be determined by the ANG based on the existing site conditions (i.e., tree cover, accessibility).

The annual radiological survey will be conducted with a Model 471RF Survey Meter. The 20-foot by 20-foot area will be surveyed at the ground surface and 3 feet above. The specifications of the monitoring instrument are in Attachment D. While this instrument does not detect alpha radiation, monitoring for alpha radiation is not necessary as long as the soil is not disturbed. If the soil is disturbed, air sampling will be conducted to detect alpha radiation. High and/or low volume air samplers will be used. Air filters will be screened on-site with ZnS scintillation counter, gas proportional counter, or sent off-site for laboratory analysis.

These institutional controls will be implemented as long as Massachusetts Military Reservation remains a military base. Levels of radioactivity considered acceptable are (1) less than two times background; or (2) 2 milli Roentgen/hr, whichever is lower (Nuclear Regulatory Commission regulations 10 CFR 20.105).

3.0 CONCLUSIONS

Based on the level of radioactive materials contained in these tubes, the potential hazard from the disposed radar tubes is negligible. Radiological studies at similar disposal study areas have not indicated contamination or human health impact.

DECISION

The National Guard Bureau has reviewed the available data and concludes that no further actions are required at Study Area LF-7.

Ronald M. Watson, P.E.
Chief, Environmental Division
Air National Guard Readiness Center

11/17/93
Date

RADAR TUBE BURIAL LANDFILL (STUDY AREA LF-7), (continued):

U.S. Environmental Protection Agency
Region I

[X] Concur

The risk does not trigger actions under the National Contingency Plan (NCP).

David Webster
Chief, Maine and Vermont
Waste Management Branch

12/9/93
Date

[ ] Non-concur (please provide reasons) _____

RADAR TUBE BURIAL LANDFILL (STUDY AREA LF-7), (continued):

Massachusetts Department of Environmental Protection

[X] Concur

George Crombie
Regional Director

1/27/94
Date

[ ] Non-concur (please provide reasons) _____

ATTACHMENT A

NGB/USAF PERSONNEL CONTACTED

NAME	POSITION	LOCATION	TELEPHONE
Mr. M. Mays Management	Chief, Radiation Safety Branch, Office of Environmental	Wright-Patterson AFB, Ohio	(513) 257-2010
Lt. S. Walker	Radiation Safety Officer	Robins AFB, Georgia	(912) 926-8860
Lt. Col. M. Washeleski	Bioenviron. Engineer	NGB Readiness Ctr.	(301) 981-8144
Col. D. Wood	Bioenviron. Engineer Chairman, Isotope Committee	Brooks AFB, Texas	(512) 536-3331

ATTACHMENT B

SELECTED RADIOACTIVE ISOTOPES

ELEMENT AND MASS NO.	HALF-LIFE*	RADIATION
Cobalt-60	5.26 years	gamma, beta
Nickel-63	92 years	low energy beta
Cesium-137	30 years	gamma, beta
Radium-226	1,620 years	alpha **
Tritium	12.26 years	low energy beta

*Bolz, Ray, E. and Tuve, George L. 1979. Handbook of Tables for Applied Engineering Science. CRC Press, Boca Raton, Florida.

**Can detect gamma from radon daughters with appropriate instrumentation.

ATTACHMENT C

RESULTS OF ANNUAL MONITORING

17 July 1993

MEMO FOR RECORD
SUBJECT: Annual Visit to Radioactive Waste Burial Site (LF-7)

1. The subject visit was conducted by the undersigned on this date. The site was surveyed with a Victoreen 475 RF which had been calibrated on 3 June 1993 and had serial number 495. No radiation levels above background were detected; All warning signs were in place, the fence was in good condition, and the gate was secured.

2. Questions on this visit should be directed to the undersigned at x4078.

Gerard K Flaherty

GERARD K. FLAHERTY, MSgt, MA ANG
NCOIC, Bioenvironmental Engineering Services

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 102D FIGHTER INTERCEPTOR WING
MASSACHUSETTS AIR NATIONAL GUARD
OTIS AIR NATIONAL GUARD BASE, MASSACHUSETTS 02542-5001

REPLY TO
ATTN OF: 102 FW/SGPB

25 June 1992

SUBJECT: Annual Visit to Radioactive Waste Burial Site (LF-7)

TO: 102 FW/DCS

1. Subject visit was conducted by the undersigned on this date. Site was surveyed with a Victoreen 471 RF, calibration date, 92168, S/N 495. No radiation levels above background were detected. A warning sign was missing on the south fence. Work order #PA 22696 was submitted to Civil Engineering to replace the sign.

2. Questions on this visit should be directed to the undersigned at X4078.

Gerard K Flaherty

GERARD K. FLAHERTY, MSGT, MA ANG
NCOIC, Bioenvironmental Engineering Services

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 102D FIGHTER INTERCEPTOR WING
MASSACHUSETTS AIR NATIONAL GUARD
OTIS AIR NATIONAL GUARD BASE, MASSACHUSETTS 02542-5001

REPLY TO ATTN OF: 102FIW/SGPB

27 June 1991

SUBJECT: Annual Visit to Radioactive Waste Burial Site

TO: 102FIW/DEMO

1. Subject visit was conducted on this date. Site was surveyed with a Victoreen 471 RF, calibration date, 91148, S/N 495. All readings were 0.0 mR/hr. A warning sign was missing on the north side and some barbed wire needed repair. Submitted job order #JOBG12659 to Civil Engineering to replace sign and repair barbed wire.

2. Questions on this visit should be directed to the undersigned at X4076.

Gerard K. Flaherty

GERARD K. FLAHERTY, MSGT, MAANG
NCOIC, Bioenvironmental Engineering Services

ATTACHMENT D

SPECIFICATIONS OF MONITORING EQUIPMENT

TABLE I: SPECIFICATIONS FOR MODEL 4713F SURVEY METER

Feature	Specification
Dimensions	30.5 cm long, 13 cm wide, 19.4 cm high (12 in. by 5-1/8 in. by 7-5/8 in.)
Weight	2.4 kg (5.3 lb) net 4 kg (12 lb) shipping
Operating Ranges:	
Rate	12 overlapping ranges 0-1, 3, 10, 30, 100, 300 mR/h, and 0-1, 3, 10, 30, 100, 300 R/h
Integrate	6 overlapping ranges 0-1, 3, 10, 30, 100, 300 mR
Radiation Detected	Beta above 200 keV, X-ray and Gamma above 40 keV
Detector	Unsealed air ionization chamber
Inner Window	0.83 mg/cm^2 (0.25 mil) mylar
Outer Window	17.0 mg/cm^2 magnesium
Readout Meter	7.94 cm (3-1/8 in.) scale, taut band movement
Controls:	
External	3-position FUNCTION switch 8-position RANGE switch Zero set and adjust knob
Internal	Collecting voltage test switch Coarse zero adjustment Calibration adjustment
Energy Response	See Figure 6
Response Time	8 seconds on 3 mR/h range 3 seconds on 10 mR/h range 2 seconds on 30 mR/h range 1½ seconds on 100 mR/h and 300 mR/h range
Duration of Switching Transients	less than 8 s with function or zero set controls
Batteries	Two 1.5 V D Cells four 22.5-V Eveready #505 batteries

Attachment 3

Survey of Background Area

1. Location: The background area was located southeast of the site. Figure 3.1 is a representative section of the LF-7 site and surrounding background areas. The outline of the background site was marked with flags and global positioning satellite (GPS) points (Figures 3.2a and b). The coordinates of all sample locations were recorded with GPS equipment with a submeter accuracy utilizing the RS-700 GPS recording software.

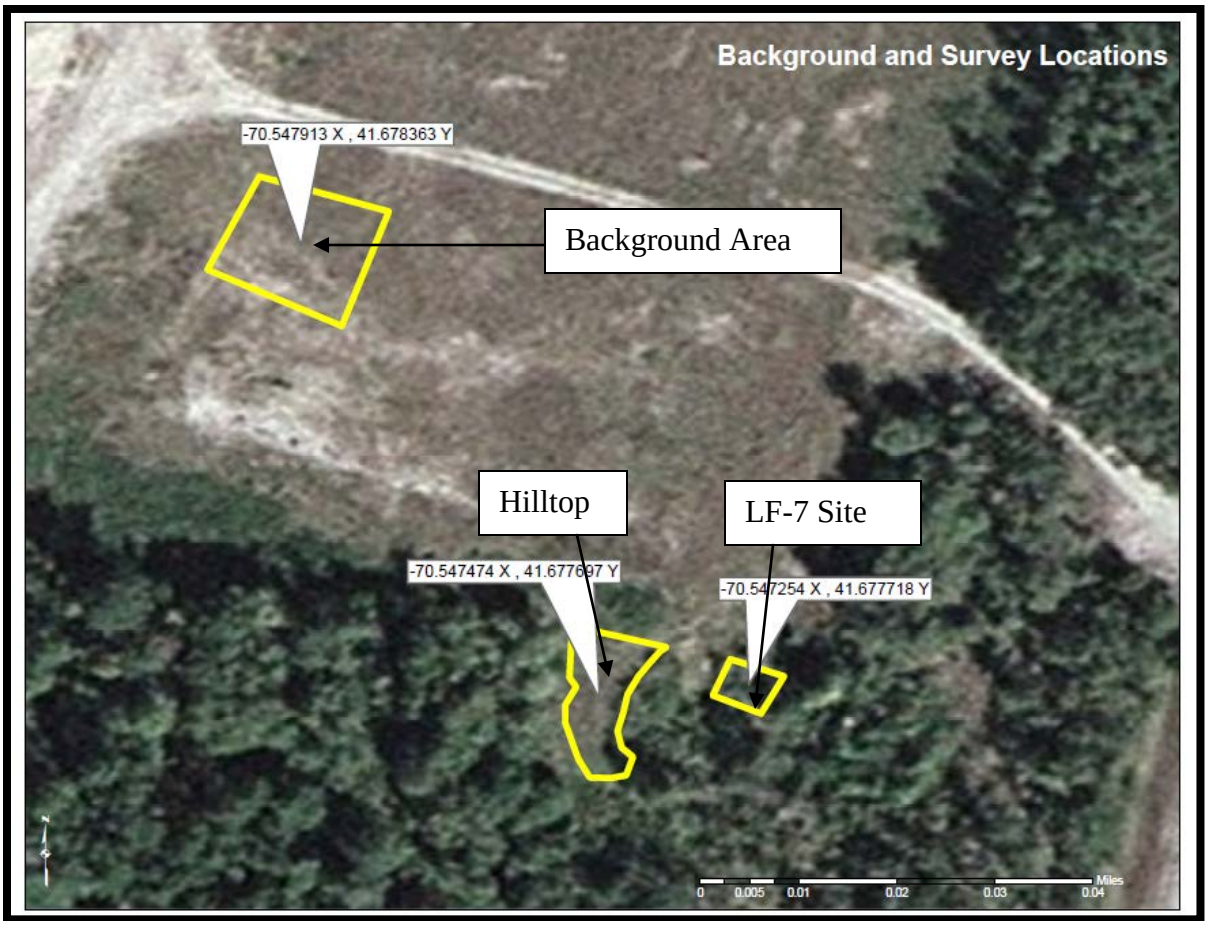


Figure 3.1. Selected Background Area

2. Geological Conditions: The average temperature for the week was 82 °F and the humidity was 62%. The soil was dry and rocky. The hard surface made it difficult to manually dig holes with a manual auger. The soil is suspected to be disturbed considering the large boulder formations located on the west side of the fence. There was also a minimal chance for water runoff, as the site is isolated from the nearest road and general population.

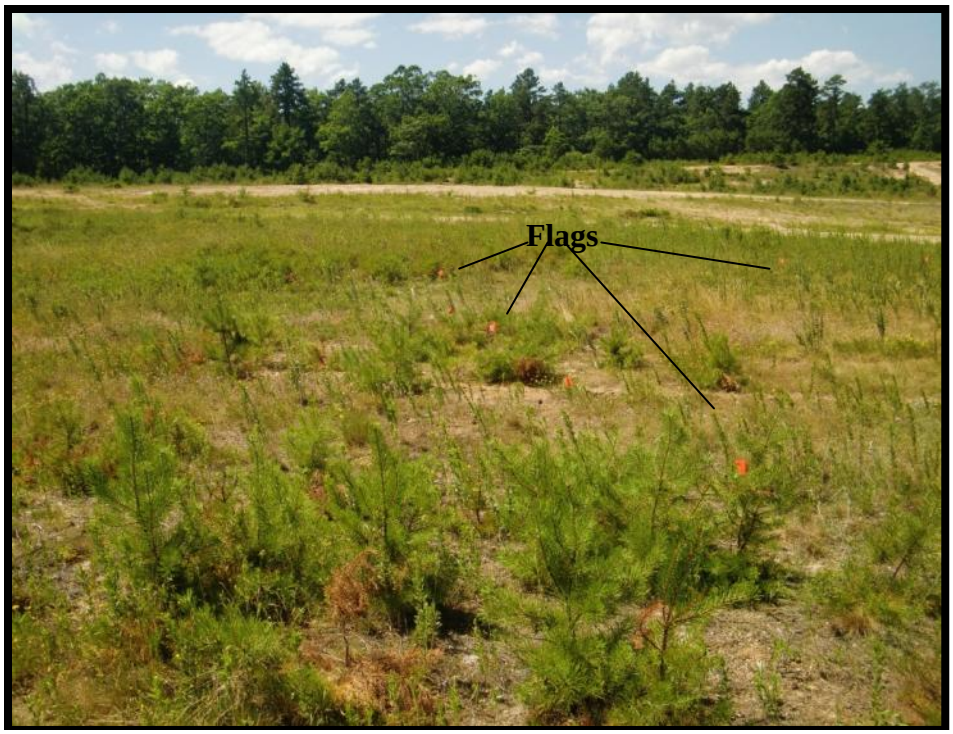


Figure 3.2a. Physical Background Markers

Figure 3.2b. Physical Background Markers

3. Background Scan: The background areas were characterized utilizing two 2x2 NaI detectors utilizing a walkover technique and with the RS-700 in situ gamma utilizing both the walkover and static scan technique. The average count rates for the Ludlum 2221 w/mated NaI were 8240 ± 2097 cpm, where the uncertainty is one standard deviation (Figures 3.3 and 3.4). The average count rate results from the RS-700 walkover scan and the static scan were 3091 ± 89 cps (Figures 3.5 and 3.6). Soil and vegetation samples were taken in each area for baseline comparisons.

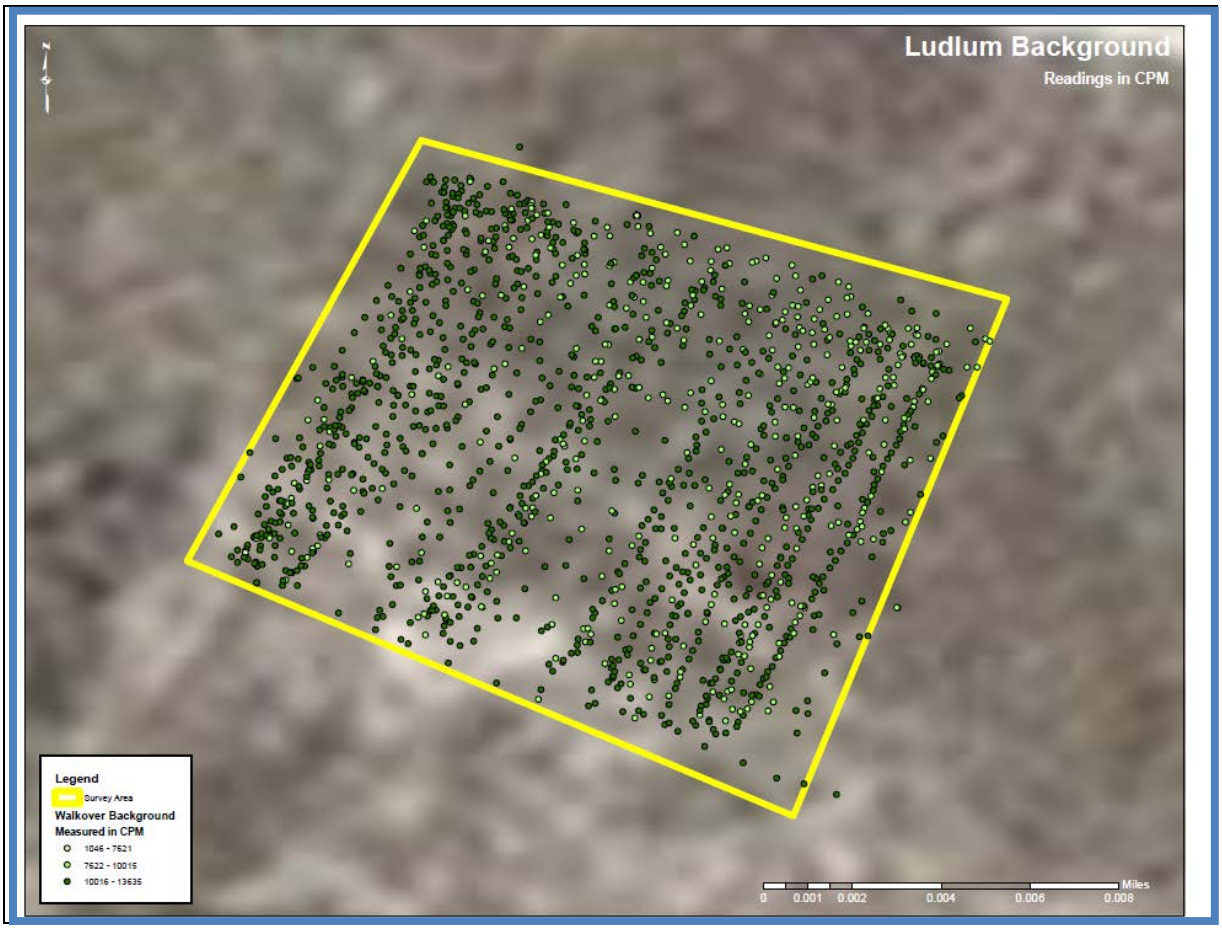


Figure 3.3. Ludlum 2221, 2x2 NaI Scan of Background Area

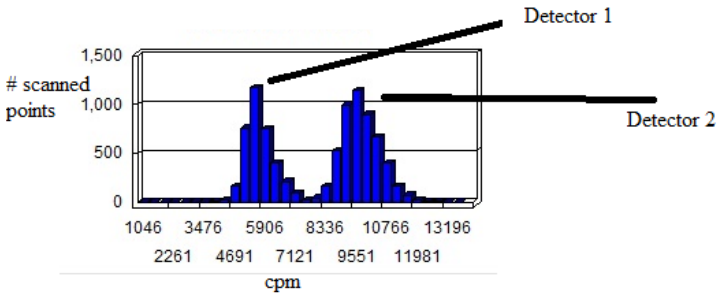


Figure 3.4. Ludlum 2221, 2x2 NaI Background Statistical Counts

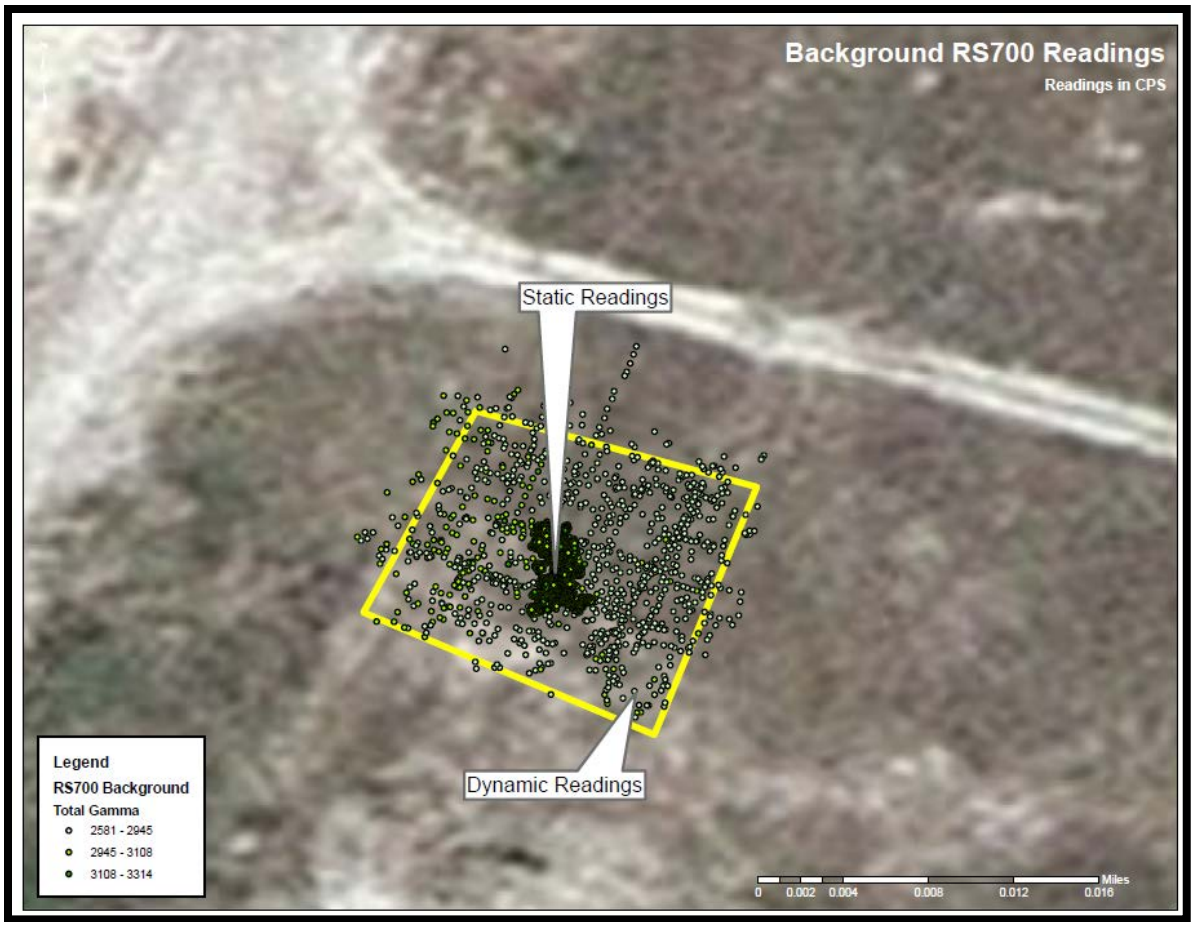


Figure 3.5. RS-700 Scan of Background Area

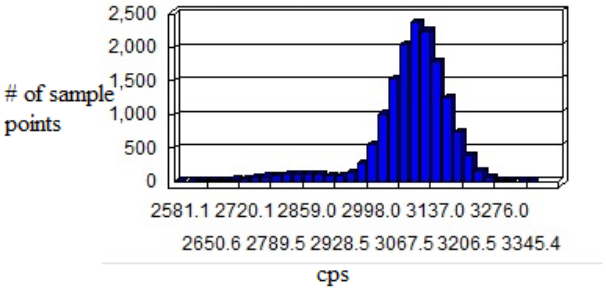


Figure 3.6. RS-700 Background Statistical Counts

4. Background Environmental Sampling: Three soil samples and one vegetation sample were taken from the background area (Figures 3.7 and 3.8). The average concentrations in pCi/g of the soil and vegetation are reported in Attachment 4, Survey of LF-7 Area.

Figure 3.7. Background Soil Sample Locations

Figure 3.8. Background Vegetation Locations

Attachment 4

Survey of LF-7 Area

1. Radiological Surface Scans: Gamma radiation screening was accomplished utilizing both the scanning technologies of the Ludlum 2221 w/mated NaI detectors and the RS-700. Figures 4.1 and 4.2 below provide detailed plots of the scans performed both inside and outside the 20-ft by 20-ft area and on the adjacent hilltop.

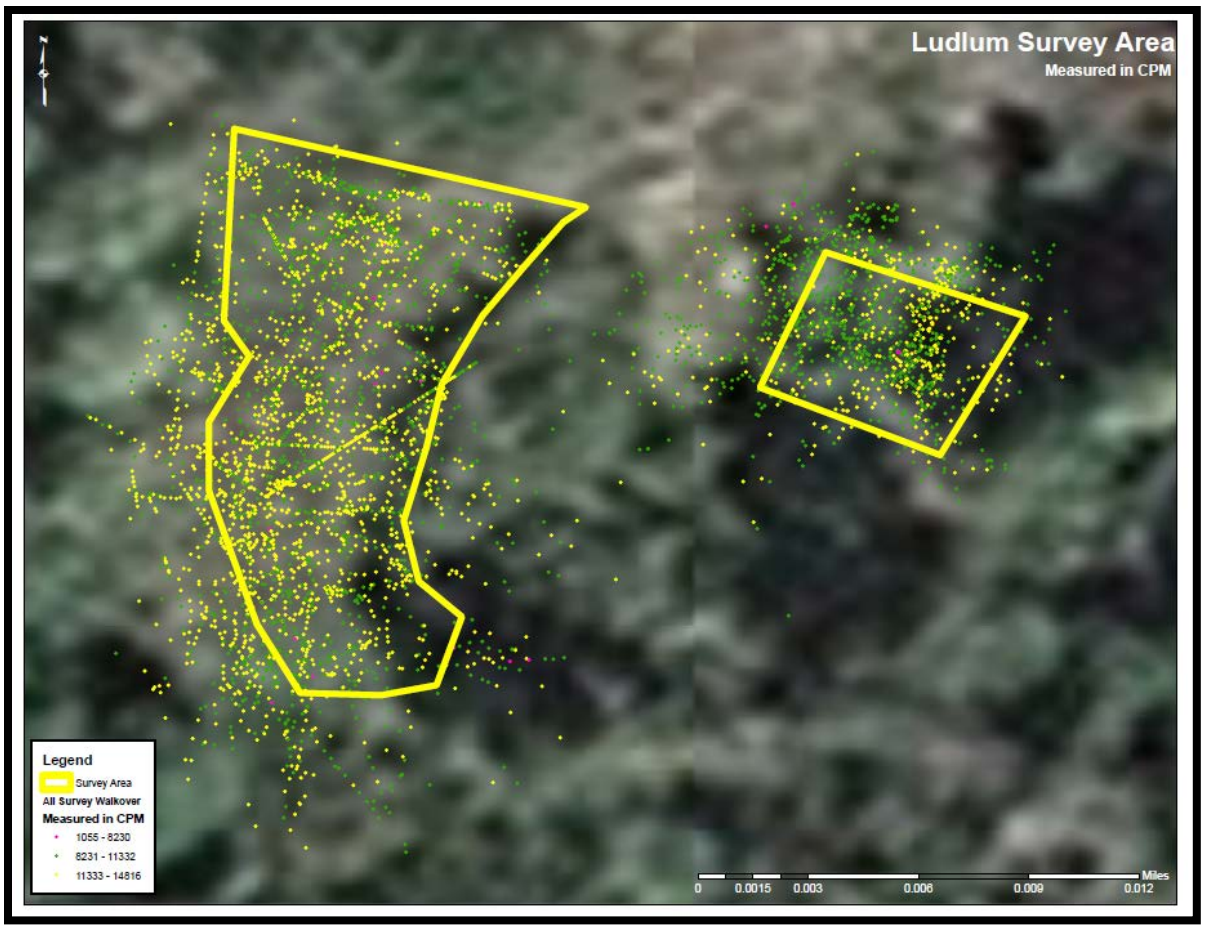


Figure 4.1. Ludlum Walkover Scans

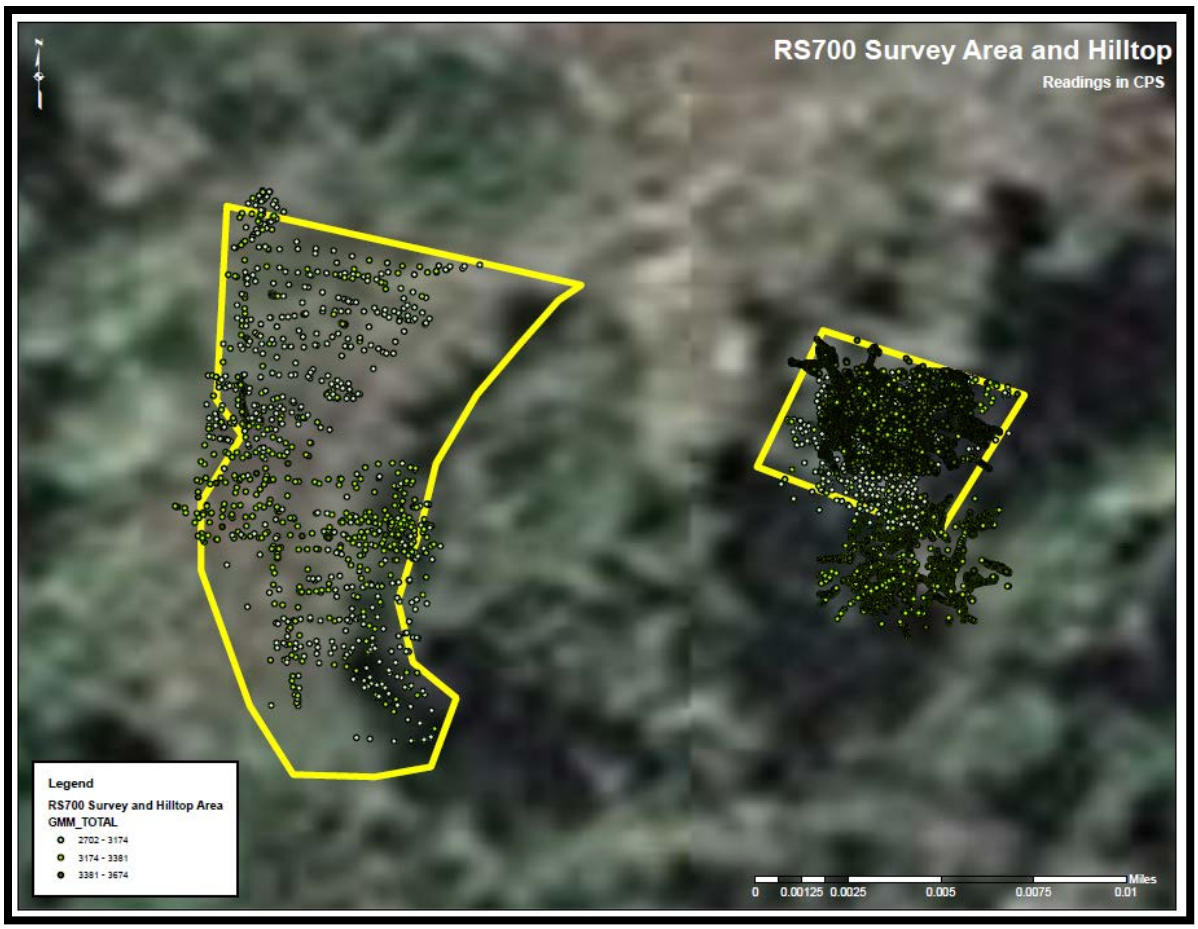


Figure 4.2. RS-700 Static and Walkover Scan

a. *Ludlum 2221 Scans*: The survey team performed a 100% walkover scan inside the fence, immediately outside the fenced area, and in a background area outside the fenced area. The typical scan speed was less than a foot per second. The survey team used the Trimble GPS units, located on each person, to obtain positional-correlated GPS/GIS reference data while scanning. The sensor and navigation data were temporarily stored in the data logger and downloaded into a laptop at the end of the day for future reference. The Ludlum 2221 recorded gamma radiation readings in cpm. Following a detailed examination of the data, no area exceeded the action level; therefore, biased samples were not appropriate at this site. The ranges and averages of gamma radiation measurements can be seen in the Figure 4.3 below.

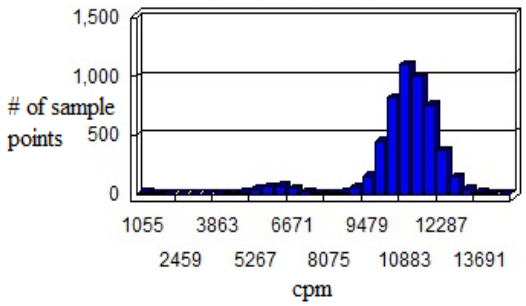


Figure 4.3. Ludlum Walkover Scan Data

b. *RS-700 Scan*: For increased sensitivity and confidence, the technicians used the Radiation Solutions, Inc. Model RS-700 "Mobile Radiation Monitoring System," mounted on a 24-ft^2, 6-in height aluminum cart. As specified in Attachment 1, this system has a 1024-channel γ–spectrometer that allows for individual isotropic identification and quantification for nuclide specific concentrations of Cs-137 and Co-60 sources. The survey team took four, 4-h-long static in situ measurements to identify ROC peaks and performed walkover scans in all areas at a scan rate of less than a foot per second. The RS-700's action alarm was set to three standard deviations above background levels as a decision point/action level, since this value will provide a 99.7% confidence that measurements below this level are background. The region of interest for Cs-137 was set to 662 keV and the Co-60 range was set for 1.1 and 1.3 MeV. The RS-700 spectrum was also analyzed for Ra-226 and any other anomalous gamma emitters in the soil. No gamma radioisotopes were identified during the static scan or the walkover scans. The results below are reported in total gamma to compare with background readings. Additional investigation conducted for all measurements that exceeded these action levels included further data analysis (to include spectral analysis), re-measurement, and then biased sampling as necessary. If the field analysis indicated results below the action level, no further scans were performed at that sample location. The ranges and averages of gamma radiation measurements can be seen in the Figure 4.4 below.

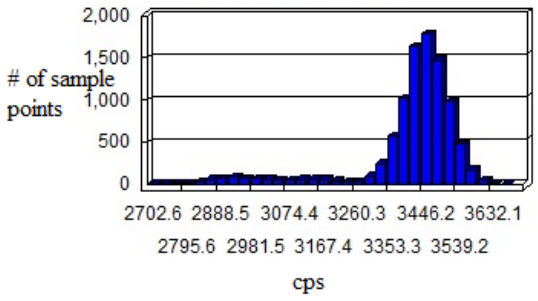


Figure 4.4. RS-700 Static and Walkover Scan Data

2. In Situ Surface Scans: For increased confidence in confirming the absence of contamination at the site, the Ortec Detective EX High Purity Germanium detector was placed inside several boreholes (Figure 4.5) to identify any suspected Cs-137, Ra-226, and Co-60 peaks at a depth of 1.5-2 ft below surface level utilizing 30- to 60-min count times. The RS-700 was used to perform additional area in situ static scans of the LF-7 site, background, and hilltop utilizing a 4-h count time. Figure 4.6 below represents an average response from the Ortec Detective EX, where the lower spectrum is the sample and the upper spectrum is the background.

Figure 4.5. Ortec Detective EX in Borehole

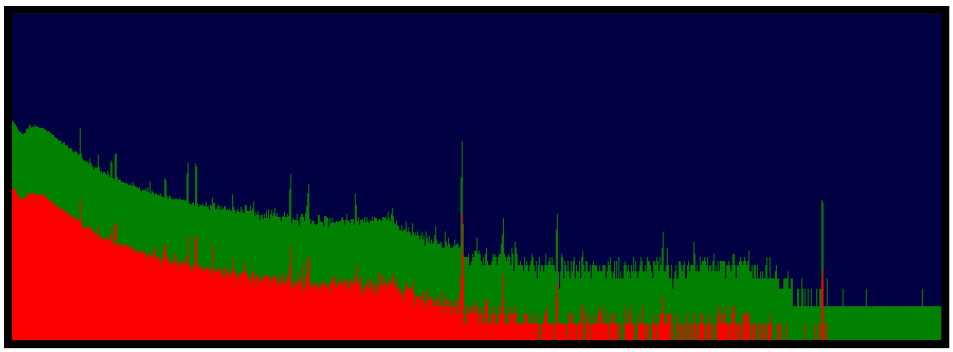


Figure 4.6. Ortec Detective EX Spectra Comparison with Background

3. Environmental Sampling:

a. *Soil Sampling*: Sample locations can be found in Figure 4.7. Unbiased soil samples were chosen based on the results of the initial Ludlum/RS-700 gamma radiation scans not exceeding actions levels (3σ). There were 48 random surface samples taken based on previous preliminary ground investigations and witness information statements that indicated that any

potential contamination was expected to occur at a depth of 2.0 ft and above. Additional samples outside the fenced area were chosen due to the risk that the fenced area might not be aligned with the true disposal area. Because the abundant photon energies are relatively low energy and subject to appreciable self-attenuation by the soil matrix, accurate quantifications can be hampered at lower concentrations and generally require soil sampling and laboratory analysis for more accurate results. Sample areas and potential anomalies found were marked with pin flags and the Trimble. There were 33 random soil samples taken inside the fenced area, 12 taken at a depth of 2 ft, and several 6-ft composite core samples taken immediately outside the fenced area with uniform distribution of samples. Thirty of the core samples were accomplished with a manual auger at 0- to 6-in, 6- to 12-in, and 12- to 24-in depths inside and outside the LF-7 site, the background area, and hilltop. Additionally, it was determined that it would not be possible to take samples at the 2-m depth without the assistance of a power auger. A power auger was requested by CE utilities. Eighteen composite soil samples were taken at 2-m depths inside and outside the LF-7 fence due to the fact that the large power auger that we brought in disrupted the soil too much; therefore, each sample can be viewed as a "0- to 2-m composite." This quantity of soil samples provides 95% confidence that analysis of soil sample results will not result in a type I error and reduces the potential effects of heterogeneity in the area. To minimize the analytical error attributed to particle size, uniformity and homogeneity samples were homogenized by hand removing small rocks and organic materials as part of the sample preparation process. After three replicate samples were compiled on a single sample, if the percent residual soil diameter was greater than 20%, the sample was then sieved through an ASTM No.10 (2-mm) pore size standard sieve. At least 2 kg of prepared samples were placed into a resealable plastic bag for direct analysis. The moisture content of the soil was estimated to be less than 20% water (i.e., the soil was not visually wet or there was no evidence of free water). The samples were sent to the USAFSAM Radioanalytical Laboratory for both gamma spectroscopy and liquid scintillation counting. Due to the anticipated workload, all samples were subcontracted to GEL Laboratories for analysis. The sample results are located below (Figures 4.8 through 4.14), where the highlighted peaks are the background sample result for visual comparison.

b. Currently, there are no applicable standards that govern radiation levels in vegetation; however, for simplicity, screening values (DCGL) for soil were applied as a reference for potential consumption purposes.

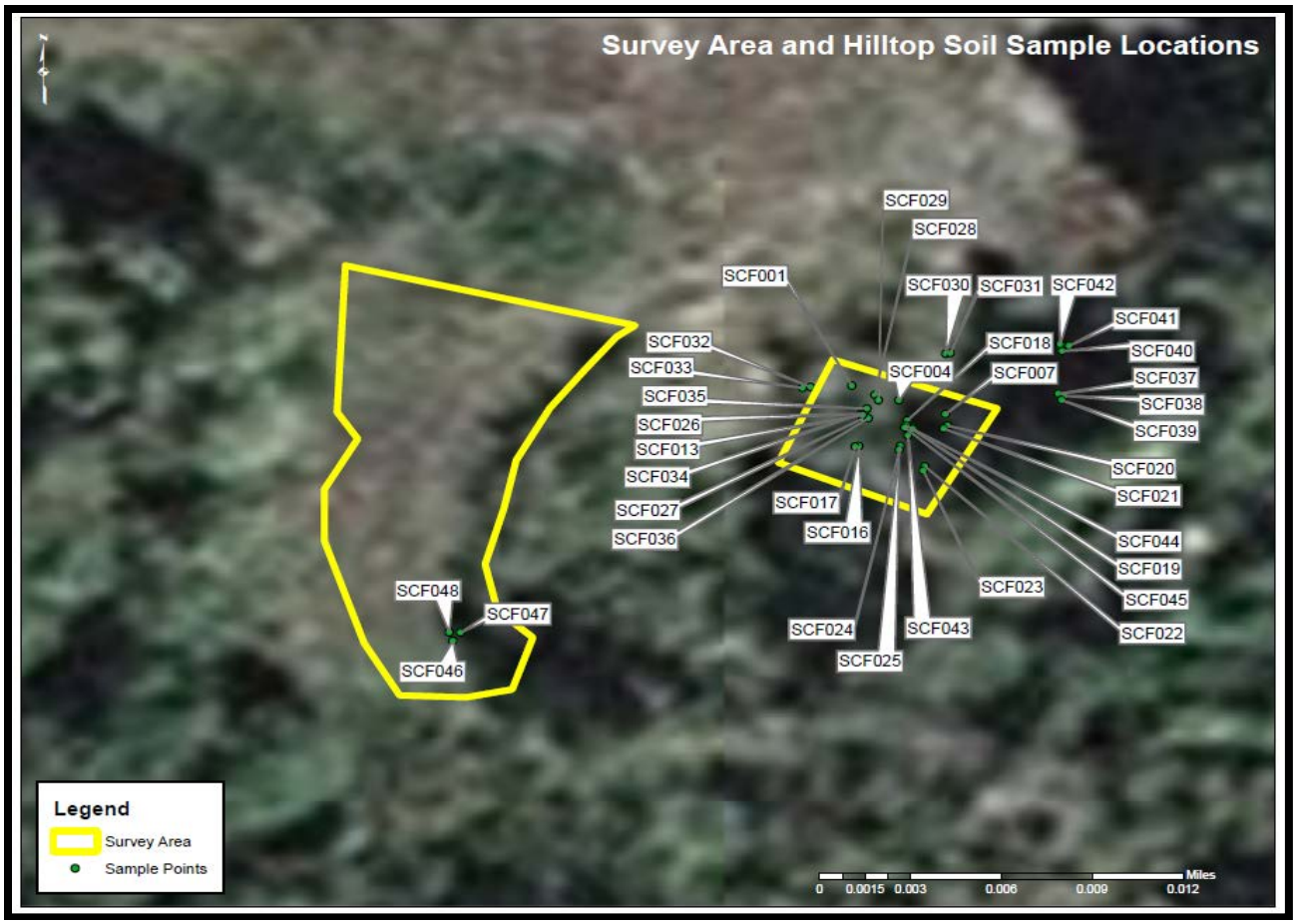


Figure 4.7. Soil Sampling Locations

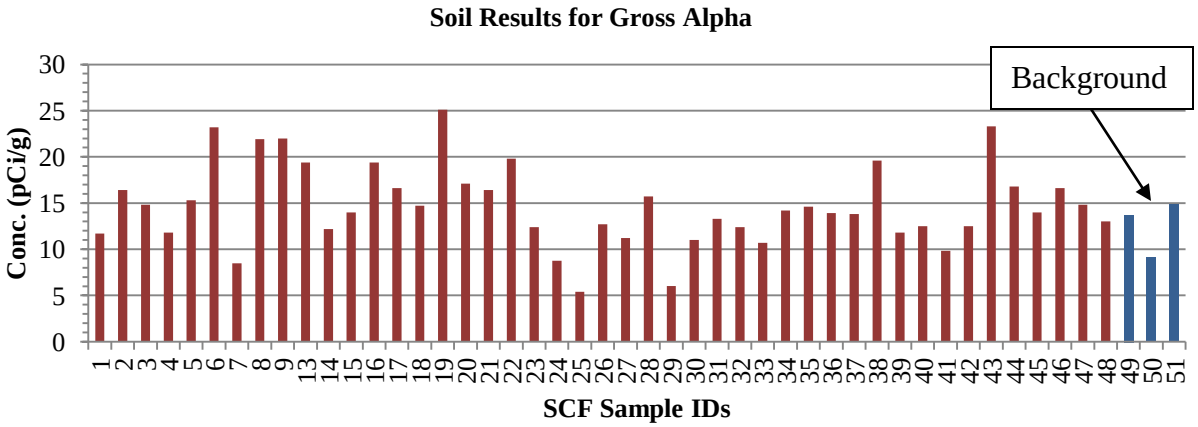


Figure 4.8. Gross Alpha Particle Laboratory Results Compared Against Background

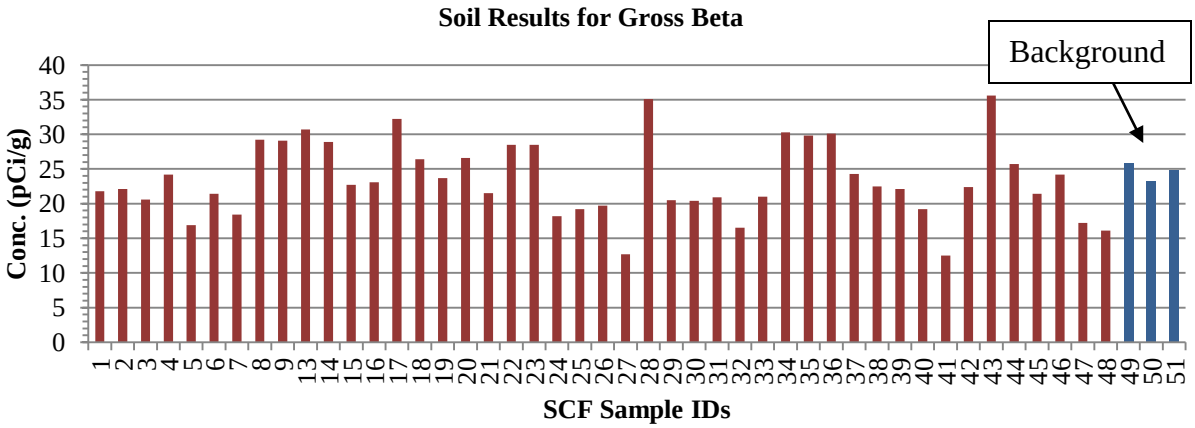


Figure 4.9. Gross Beta Particle Laboratory Results Compared Against Background

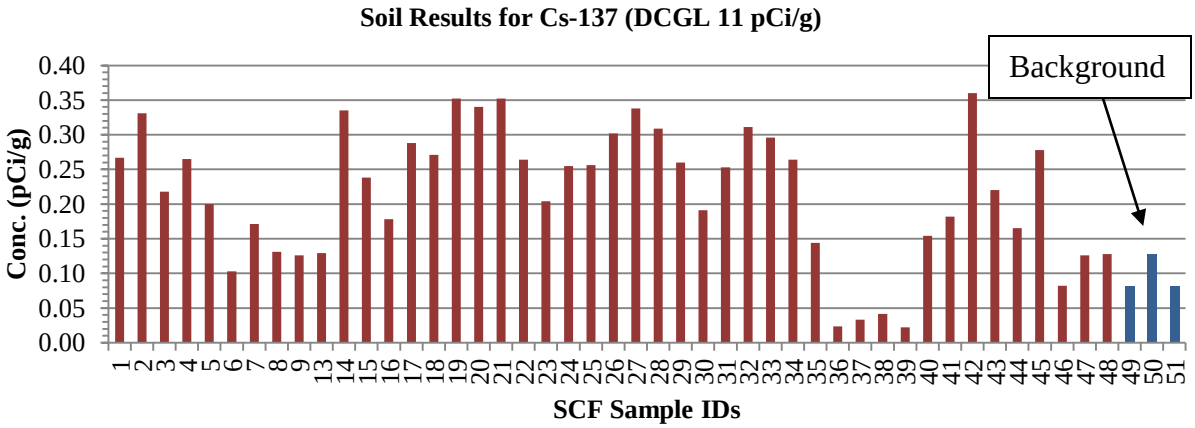


Figure 4.10. Cs-137 Soil Results Compared Against Background

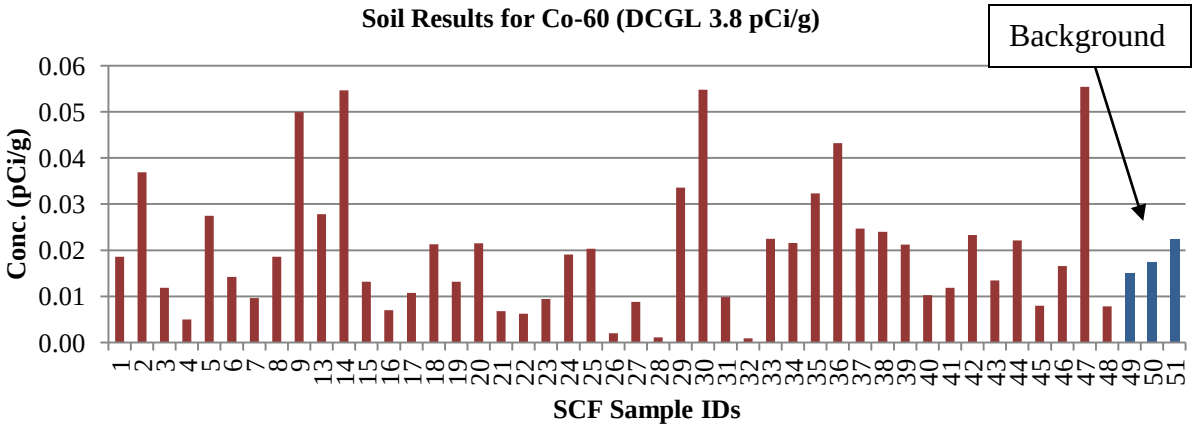


Figure 4.11. Co-60 Soil Results Compared Against Background

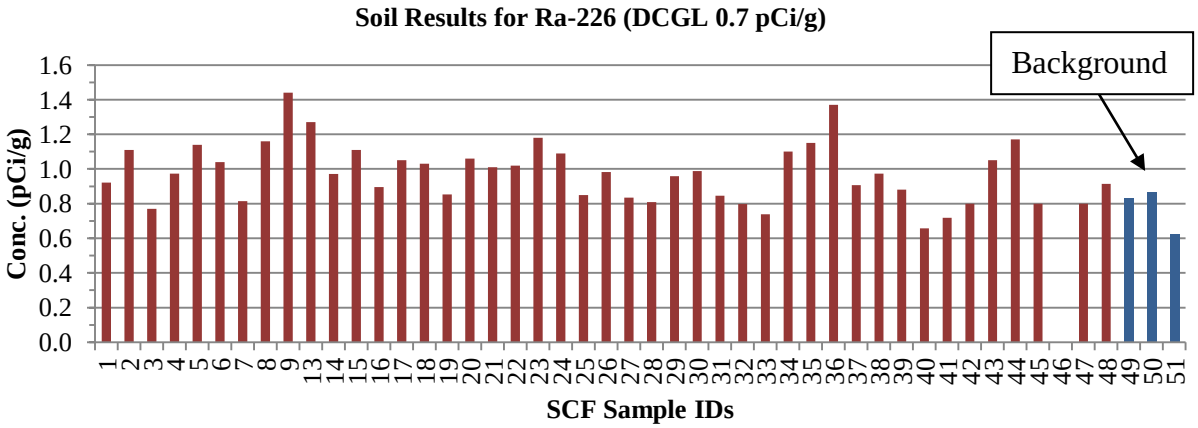


Figure 4.12. Ra-226 Soil Results Compared Against Background

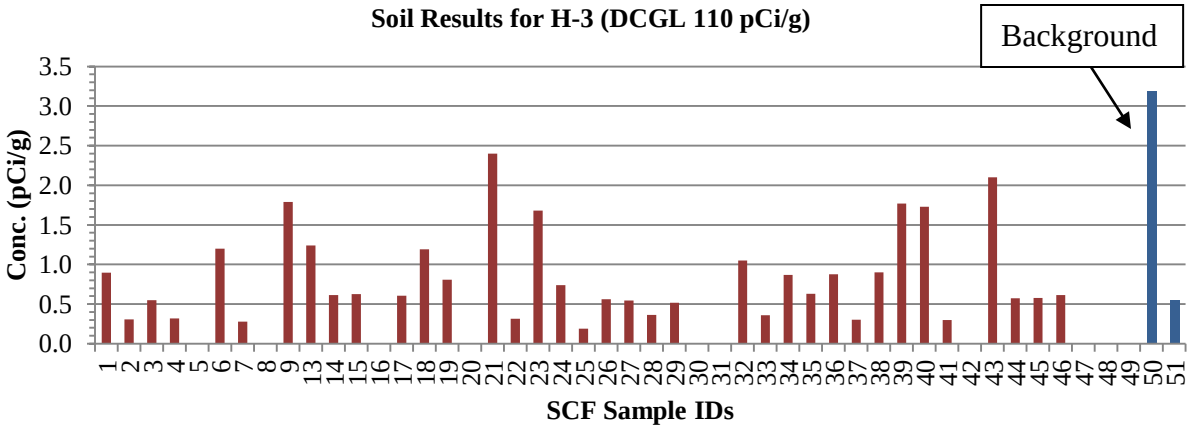


Figure 4.13. Tritium Soil Results Compared Against Background

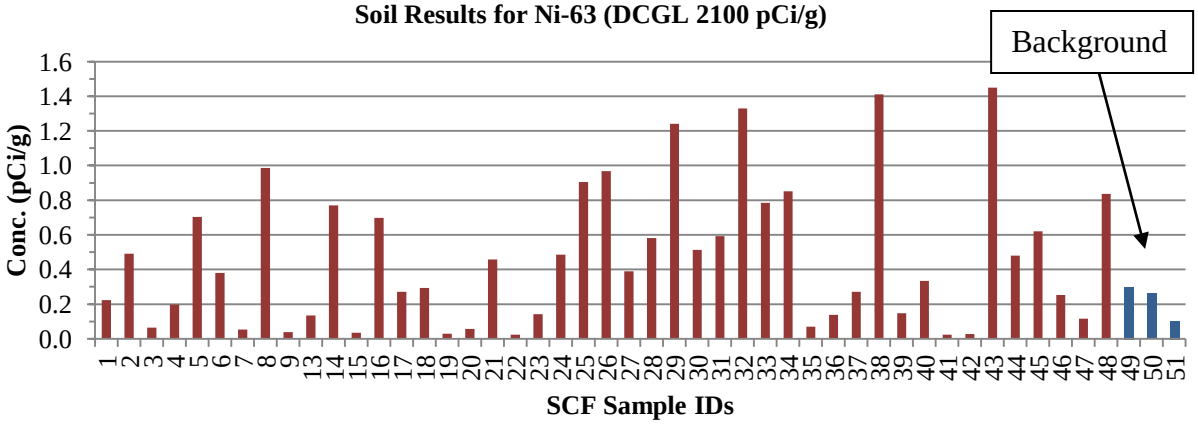


Figure 4.14. Ni-63 Soil Results Compared Against Background

c. *Vegetation Sampling*: Although vegetation is not routinely obtained for analyses, the survey team deemed it necessary to collect vegetation to rule out food chain contamination for future use (Figure 4.15). Vegetation growing on site soil was sampled and then sent to USAFSAM for laboratory analysis. Several kilograms of vegetation were taken to ensure sensitivities could be met for H-3 and Ni-63. The team took four, 3-liter densely packed samples that were double bagged into a 1-gal ziplock bag. Due to the anticipated workload, all samples were subcontracted to GEL Laboratories for analysis. The sample results are located in Figures 4.16 through 4.22, where the highlighted peaks are the background sample result for visual comparison.

Figure 4.15. Vegetation Sample Locations

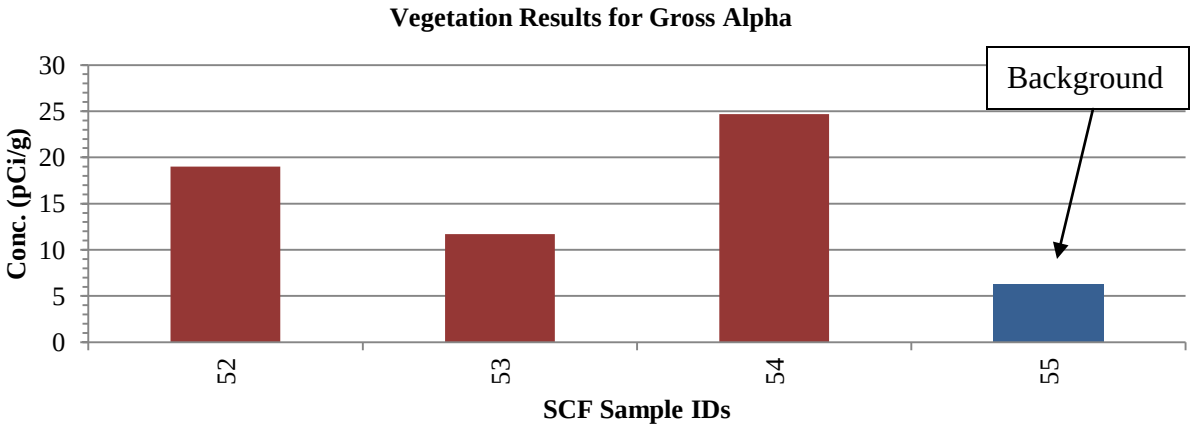


Figure 4.16. Total Gross Alpha Vegetation Results Compared Against Background

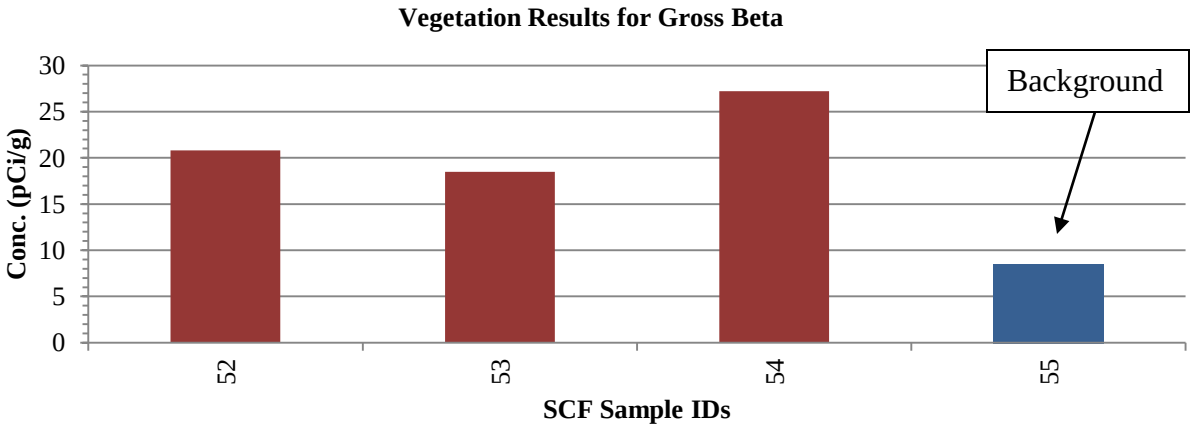


Figure 4.17. Total Gross Beta Vegetation Results Compared Against Background

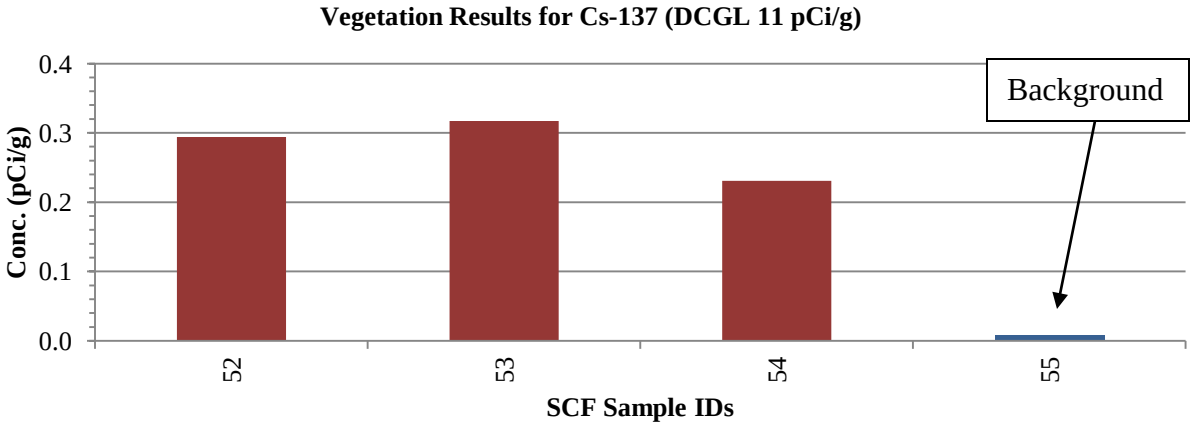


Figure 4.18. Cs-137 Vegetation Results Compared Against Background

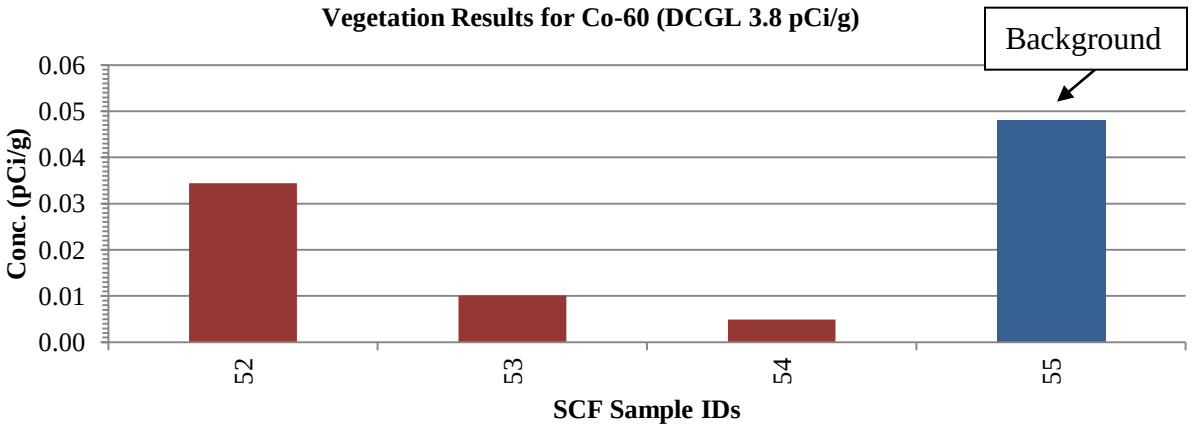


Figure 4.19. Co-60, Vegetation Results Compared Against Background

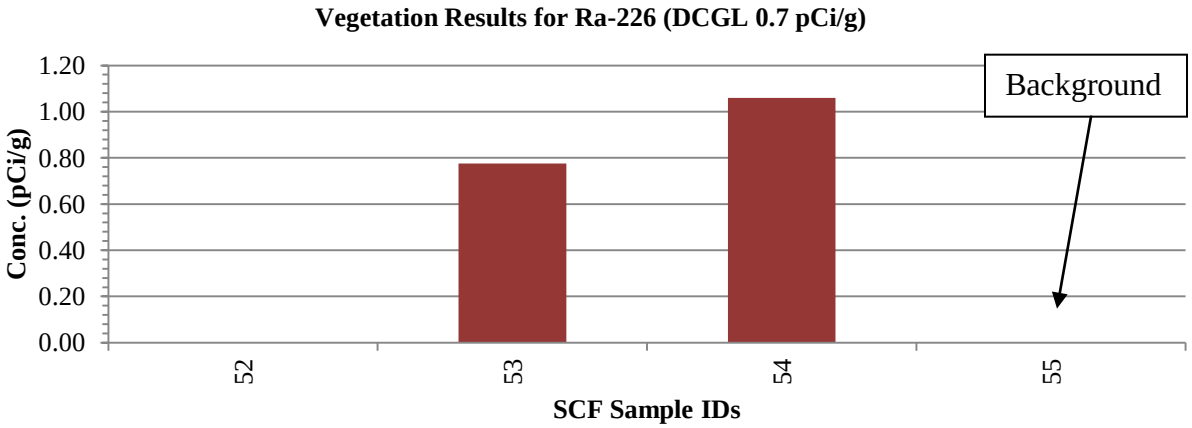


Figure 4.20. Ra-226 Vegetation Results Compared Against Background

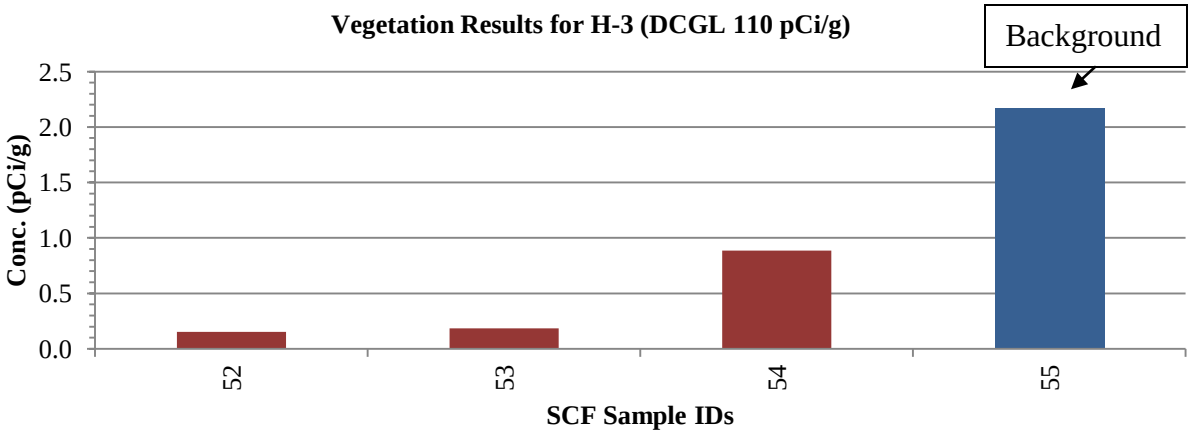


Figure 4.21. Tritium Vegetation Results Compared Against Background

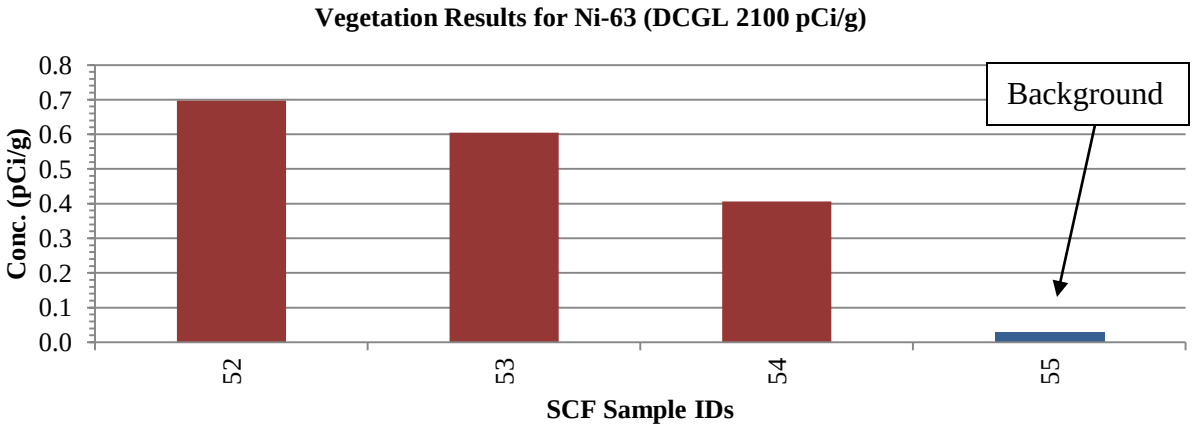


Figure 4.22. Ni-63 Vegetation Results Compared Against Background

Attachment 5

Equipment Calibration Certificates

Note. The RS-700 was internally calibrated to a 10 μCi Cs-137 source and a Co-60 source prior to and after shipping to the LF-7 site. Radioisotope alarms were established utilizing the peaks identified from these check sources. The RS-700 was also calibrated with natural Th-232.

DEPARTMENT OF THE AIR FORCE
USAF SCHOOL OF AEROSPACE MEDICINE (AFMC)
OCCUPATIONAL ENVIRONMENTAL HEALTH/RADIATION HEALTH (OEHH)
WRIGHT-PATTERSON AFB OHIO

CERTIFICATE OF CALIBRATION

Mfg. Ludlum Model 2221 Serial # 169220 Index # 05682 Date: 28 Nov 11
Mfg. Ludlum Model 44-10 Serial # PR276618 Index # 100564 Cal. Due Date: 28 Nov 12

TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT

NIST Traceable Check Sources

Isotope	*Serial #*	*Cert. Date*	*DPM*
Cs-137	**RP3067**	**1 Nov 04**	**2,454,000**

Reference Instruments

Mfg.	*Model*	*Serial #*	*Cal. Due Date*
Ludlum	**500-1**	**102951**	**8 Feb 2012**

Measurement Standards and test equipment used are traceable to the National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facilities.

☑ Battery Ck. ☑ Mechanical Ck. ☑ Meter Zeroed ☑ Reset Ck. NA Alarm Ck.
☑ Audio Ck. ☑ Geotropism Ck. (E) F/S Resp. Ck. ☑ Window Op.

As Found HV 1003 VDC Temperature 72.6 °F Relative Humidity 55.7 %

Final Volt. Set 1150 VDC Threshold (LLD) 10 mV Window (ULD) 20 mV Window width 10 mV

HV Readout (2 points) Reference: 500 V Inst. Readout: 503 V ± 2%
Reference: 1000 V Inst. Readout: 1000 V ± 2%

RANGE MULTIPLIER	REFERENCE CAL. POINT	"AS FOUND" READING	CORRECTED READING
x 1000	400 CPM	400,000 CPM	400,000 CPM
x 1000	100 CPM	100,000 CPM	100,000 CPM
x 100	400 CPM	40,000 CPM	40,000 CPM
x 100	100 CPM	10,000 CPM	10,000 CPM
x 10	400 CPM	4,000 CPM	4,000 CPM
x 10	100 CPM	1,000 CPM	1,000 CPM
x 1	400 CPM	400 CPM	400 CPM
x 1	100 CPM	100 CPM	100 CPM
Log Scale	200 CPM	200 CPM	200 CPM

DIGITAL SCALER READOUT

CAL. REF. POINT	AS FOUND READING	CORRECTED READING
40,000 CPM	39,989 CPM	39,989 CPM

*UNCERTAINTY WITHIN ± 10% CORRECTION FACTOR WITHIN ± 20%

COMMENTS: Calibration Interval = 1 year Use "Window Out"
Cs-137 Eff: 3100 CPM/μCi/m2 @ 2"
U-238 Eff: Not NIST Traceable Response curve determined
Procedural Authority - ICP#22210000

Calibrated By: Stu Hutchinson Date: 28 Nov 2011
Reviewed By: [signature] Date: 30 Nov 11

DEPARTMENT OF THE AIR FORCE
USAF SCHOOL OF AEROSPACE MEDICINE (AFMC)
OCCUPATIONAL ENVIRONMENTAL HEALTH/RADIATION HEALTH (OEHH)
WRIGHT-PATTERSON AFB OHIO

CERTIFICATE OF CALIBRATION

Meter
Mfg. Ludlum Model 2221 Serial # 169220 Index # 05682 Date: 23 Sep 11
Cal. Due Date: 23 Sep 12

TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT

NIST Traceable Check Sources				Reference Instruments			
Isotope	*Serial #*	*Cert. Date*	*DPM*	*Mfg.*	*Model*	*Serial #*	*Cal. Due Date*
Cs-137	**RP3067**	**1 Nov 04**	**2,454,000**	**Ludlum**	**500-1**	**102951**	**8 Feb 2012**

Measurement Standards and test equipment used are traceable to the National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facilities.

NaI DETECTOR HIGH VOLTAGE OPTIMIZATION

Probe #1
Mfg. Ludlum
Model 44-10
Serial # PR276618
Index # 100864
Isotope: Cs-137

High Voltage	CPM
800	10621
850	12,454
900	13,563
950	14,143
1000	14,711
1050	15,065
1100	15,180
1150	15,388
1200	15,357
1250	15,466
1300	15,581
1350	15,935
1400	17,650
Bkgd@1150	4610

Final Volt. Set 1150 VDC
Efficiency 3100 CPM/μci/m² @12"

Probe #2
Mfg. Ludlum
Model 44-10
Serial # PR276618
Index # 100864
Isotope: DU-slug

High Voltage	CPM
800	9827
850	12,634
900	16,070
950	17,389
1000	17,551
1050	18,235
1100	18,282
1150	18,753
1200	18,380
1250	18,650
1300	18,424
1350	18,827
1400	20,465
Bkgd@1150	4610

Final Volt. Set 1150 VDC
Efficiency NA CPM/μci/m² @12"

Probe #3
Mfg.
Model
Serial #
Index #
Isotope:

High Voltage	CPM

Final Volt. Set VDC
Efficiency % 2π@¼"

COMMENTS: Calibration Interval = 1 year Use "Window Out"
U-238 response curve determined.

Calibrated By: Stu Hutchinson Date: 28 Nov 2011
Reviewed By: [signature] Date: 30 Nov 11

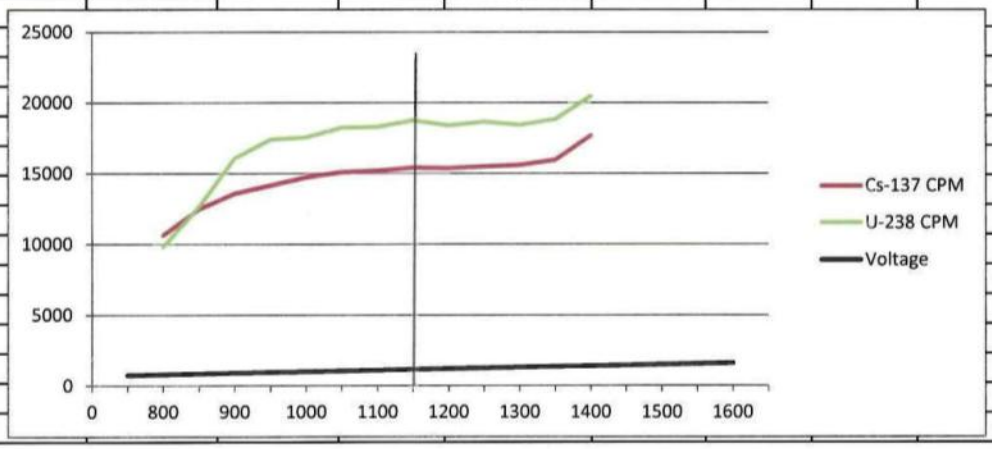
HotSpot FIDLER Text File Output

HotSpot FIDLER Calibration Information

```
Report Date                 :  Nov 28 2011 07:54 AM
Calibration Date            :  28 Nov, 2011
Target Mix                  :  Other Nuclide Check Source
Radionuclide                :  Cs-137
Detector Barcode Number     :  100864
Meter Barcode Number        :  05682
Detector Manufacturer       :  Ludlum
Detector Model Number       :  44-10
Detector Serial Number      :  PR276618
Meter Manufacturer          :  Ludlum
Meter Model Number          :  2221
Meter Serial Number         :  169220

Check Source I.D.           :  RP 3067
Calibration Date            :  28 Nov, 2011
Calibrated by               :  Stu Hutchinson
Check Source Activity (uCi):  1.100E+00
Check Source 17-keV Self    :  1.000E+00

Sample Counting Time (minutes)     :  1.000E+00
Detector Height (cm)        :  3.000E+01


Cs-137 Window Information:
Background (cpm)                      :  4,610
Areal Limit of Sensitivity (uCi/m2)   :  1.0E-01
Point Limit of Sensitivity (uCi)      :  9.9E-02
K-factor (m2)                         :  0.96
Counting Data (counts):
   0-cm:  8160
  20-cm:  7183
  40-cm:  6257
  60-cm:  5570
  80-cm:  5099
 100-cm:  4844
Instrument Type     :Other
Window Option:Only 60 keV
Units:Classic
This is an actual 2 x2  calibration and the values are typical of most 2 x2
configurations.

Detector Calibration Results

Cs-137 Window Information:
Cs-137 Detector Efficiency (cpm/(uCi/m2)):  3.1E+03
Cs-137 Detector Areal LOS (uCi/m2)        :  1.0E-01
Cs-137 Detector Point LOS (uCi)           :  9.9E-02
Cs-137 Detector Background Rate (cpm)     :  4,610
Cs-137 Detector Check Source Rate (cpm)   :  3,550
Cs-137 Detector K-Factor (m2)             :  0.96
Cs-137 Detector K-Factor sdev (%)         :  7.5
```

Cs-137 Eff: 3,100 CPM/uCi/m² @ 12"

VDC	CS-137 CPM	DU Slug		Ludlum 2221	SN169220			
				Ludlum 44-10	SN276618			
750								
800	10621	9827						
850	12454	12634						
900	13563	16070						
950	14143	17389						
1000	14711	17551						
1050	15065	18235						
1100	15180	18282						
1150	15388	18753						
1200	15357	18380						
1250	15466	18650						
1300	15581	18424						
1350	15935	18827						
1400	17650	20455						
1450								
1500								
1550								
1600								



DEPARTMENT OF THE AIR FORCE
USAF SCHOOL OF AEROSPACE MEDICINE (AFMC)
OCCUPATIONAL ENVIRONMENTAL HEALTH/RADIATION HEALTH (OEHH)
WRIGHT-PATTERSON AFB OHIO

CERTIFICATE OF CALIBRATION

Mfg. Ludlum Model 2221 Serial # 218606 Index # 099333 Date: 23 Nov 11
Mfg. Ludlum Model 44-10 Serial # PR276614 Index # 100861 Cal. Due Date: 23 Nov 12

TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT

NIST Traceable Check Sources				Reference Instruments			
Isotope	*Serial #*	*Cert. Date*	*DPM*	*Mfg.*	*Model*	*Serial #*	*Cal. Due Date*
Cs-137	**RP3067**	**1 Nov 04**	**2,454,000**	**Ludlum**	**500-1**	**102951**	**8 Feb 2012**

Measurement Standards and test equipment used are traceable to the National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facilities.

☑ Battery Ck. ☑ Mechanical Ck. ☑ Meter Zeroed ☑ Reset Ck. NA Alarm Ck.
☑ Audio Ck. ☑ Geotropism Ck. ☑ F/S Resp. Ck. ☑ Window Op.

As Found HV 991 VDC Temperature 72.7 °F Relative Humidity 55 %

Final Volt. Set 100 VDC Threshold (LLD) 10 mV Window (ULD) 20 mV Window width 10 mV

HV Readout (2 points) Reference: 500 V Reference: 1000 V
Inst. Readout: 500 V ± 2% Inst. Readout: 1000 V ± 2%

RANGE MULTIPLIER	REFERENCE CAL. POINT	"AS FOUND" READING		CORRECTED READING	
x 1000	400 CPM	400,000	CPM	400,000	CPM
x 1000	100 CPM	100,000	CPM	100,000	CPM
x 100	400 CPM	40,000	CPM	40,000	CPM
x 100	100 CPM	10,000	CPM	10,000	CPM
x 10	400 CPM	4,000	CPM	4,000	CPM
x 10	100 CPM	1,000	CPM	1,000	CPM
x 1	400 CPM	400	CPM	400	CPM
x 1	100 CPM	100	CPM	100	CPM
Log Scale	200 CPM	200	CPM	200	CPM

DIGITAL SCALER READOUT

CAL. REF. POINT	AS FOUND READING		CORRECTED READING	
40,000 CPM	39,886	CPM	39,886	CPM

*UNCERTAINTY WITHIN ± 10% CORRECTION FACTOR WITHIN ± 20%

COMMENTS: Calibration Interval = 1 year Use "Window Out"
Cs-137 Eff: 6,500 CPM/uci/m² @ 12"

Procedural Authority - ICP#22210000

Calibrated By: Stu Hutchinson Date: 23 Nov 2011

Reviewed By: Pipp Nill Date: 30 Nov 11

DEPARTMENT OF THE AIR FORCE
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WRIGHT-PATTERSON AFB OHIO

CERTIFICATE OF CALIBRATION

Meter
Mfg. Ludlum Model 2221 Serial # 218606 Index # 099333 Date: 23 Nov 11 Cal. Due Date: 23 Nov 12

TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT

NIST Traceable Check Sources

Isotope	*Serial #*	*Cert. Date*	*DPM*
Cs-137	**RP3067**	**1 Nov 04**	**2,454,000**

Reference Instruments

Mfg.	*Model*	*Serial #*	*Cal. Due Date*
Ludlum	**500-1**	**102951**	**8 Feb 2012**

Measurement Standards and test equipment used are traceable to the National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facilities.

NaI DETECTOR HIGH VOLTAGE OPTIMIZATION

Probe #1
Mfg. Ludlum
Model 44-10
Serial # PR276614
Index # 100861
Isotope: Cs-137

High Voltage	CPM
750	7834
800	9969
850	11523
900	12240
950	12771
1000	12851
1050	13589
1100	13500
1150	13697
1200	13684
1250	13908
1300	13966
1350	17910
Bkgd@ 1100	4669

Final Volt. Set 1100 VDC
Efficiency 6500 CPM/μci/m² @12"

Probe #2
Mfg.
Model
Serial #
Index #
Isotope:

High Voltage	CPM

Final Volt. Set VDC
Efficiency CPM/μci/m² @12"

Probe #3
Mfg.
Model
Serial #
Index #
Isotope:

High Voltage	CPM

Final Volt. Set VDC
Efficiency % 2π@¼"

COMMENTS: Calibration Interval = 1 year Use "Window Out"

Calibrated By: Stu Hutchinson Date: 23 Nov 2011
Reviewed By: Ryan Nill Date: 30Nov11

HotSpot FIDLER Text File Output
HotSpot FIDLER Calibration Information

Report Date	:	Nov 23 2011 07:07 AM
Calibration Date	:	23 Nov. 2011
Target Mix	:	Other Nuclide Check Source
Radionuclide	:	Cs-137
Detector Barcode Number	:	100861
Meter Barcode Number	:	099333
Detector Manufacturer	:	Ludlum
Detector Model Number	:	44-10
Detector Serial Number	:	PR276614
Meter Manufacturer	:	Ludlum
Meter Model Number	:	2221
Meter Serial Number	:	218606
Check Source I.D.	:	RP 3067
Calibration Date	:	23 Nov, 2011
Calibrated by	:	Stu Hutchinson
Check Source Activity (uCi):		1.100E+00
Check Source 17-keV Self	:	1.000E+00
Sample Counting Time (minutes)	:	1.000E+00
Detector Height (cm)	:	3.000E+01

Cs-137 Window Information:

Background (cpm)	:	4,669
Areal Limit of Sensitivity (uCi/m2)	:	4.9E-02
Point Limit of Sensitivity (uCi)	:	1.0E-01
K-factor (m2)	:	2.07

Counting Data (counts):

0-cm:	8120
20-cm:	7179
40-cm:	6081
60-cm:	5469
80-cm:	5167
100-cm:	5069

Instrument Type :Other
Window Option:Only 60 keV
Units:Classic
This is an actual 2 x2 calibration and the values are typical of most 2 x2 configurations.

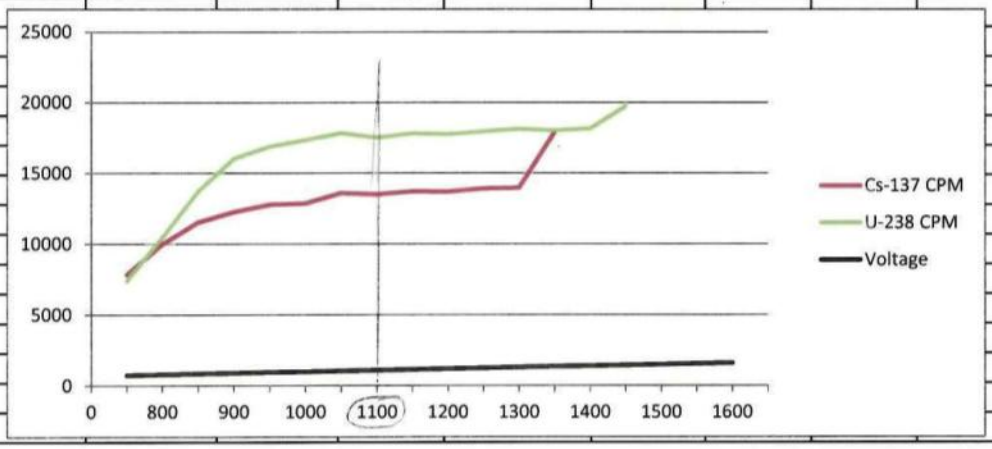
Detector Calibration Results

Cs-137 Window Information:

Cs-137 Detector Efficiency (cpm/(uCi/m2)):		6.5E+03
Cs-137 Detector Areal LOS (uCi/m2)	:	4.9E-02
Cs-137 Detector Point LOS (uCi)	:	1.0E-01
Cs-137 Detector Background Rate (cpm)	:	4,669
Cs-137 Detector Check Source Rate (cpm)	:	3,451
Cs-137 Detector K-Factor (m2)	:	2.07
Cs-137 Detector K-Factor sdev (%)	:	7.5

Cs-137 Eff: 6,500 CPM/uci/m² @ 12"

VDC	CS-137 CPM	DU Slug		Ludlum 2221	SN 218606			
				Ludlum 44-10	SN 276614			
750	7834	7417						
800	9969	10456						
850	11523	13713						
900	12240	16030						
950	12771	16869						
1000	12851	17336						
1050	13589	17835						
1100	13500	17515						
1150	13697	17816						
1200	13684	17764						
1250	13908	17946						
1300	13966	18133						
1350	17910	18023						
1400		18159						
1450		19730						
1500								
1550								
1600								



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CERTIFICATE OF CALIBRATION

Mfg. Bicron Model Surveyor M Serial # A826P Index # 03644 Date: 14Sep11
Mfg. Bicron Model PGM Serial # A117N Index # ____ Cal. Due Date: 14Sep12

TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT

NIST Traceable Check Sources

Isotope	Serial #	Cert. Date	EPM
Tc-99	RP3073	28Sep04	29760

Reference Instruments

Mfg.	Model	Serial #	Cal. Due Date
Ludlum	500-1	102951	8 Feb 2012

Measurement Standards and test equipment used are traceable to the National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facilities.

☑ Battery Ck. ☑ Mechanical Ck. ☑ Meter Zeroed NA Reset Ck. NA Alarm Ck.
☑ Audio Ck. ☑ Geotropism Ck. ☑ F/S Resp. Ck. NA Window Op.

As Found HV 926 VDC Temperature 71.5 °F Relative Humidity 58.8 %

Final Volt. Set 900 VDC Threshold (LLD) 70 mV Window (ULD) NA mV Window width NA mV

HV Readout (2 points) Reference: 400 V Reference: 1600 V
Inst. Readout: 400 V ± 2% Inst. Readout: 1600 V ± 2%

RANGE MULTIPLIER	REFERENCE CAL. POINT	"AS FOUND" READING		CORRECTED READING	
x 1000	800 CPM	1,000,000	CPM	800,000	CPM
x 1000	200 CPM	200,000	CPM	200,000	CPM
x 100	800 CPM	80,000	CPM	80,000	CPM
x 100	200 CPM	20,000	CPM	20,000	CPM
x 10	800 CPM	8,200	CPM	8,000	CPM
x 10	200 CPM	2,000	CPM	2,000	CPM
x 1	800 CPM	800	CPM	800	CPM
x 1	200 CPM	200	CPM	200	CPM

*UNCERTAINTY WITHIN ± 10% CORRECTION FACTOR WITHIN ± 20%

COMMENTS: Calibration Interval = 1 year
Background: 35 CPM HV: 900 V EPM=2π Source Emission Rate per Min
Instrument Reading w/source: 7300 CPM
Surface Area of Detector: 15.5 Active area cm^2
Instrument Effeciency (ε_i): 24.4 @ 1/4 inch
USE WINDOW OUT **Procedural Authority - ICP #BISVRM**

Calibrated By: Stu Hutchinson Date: 14Sep11
Reviewed By: Pipm Wh Date: 15Sep11

Attachment 6

Pictures

Figure 6.1. LF-7 Site

Figure 6.2. LF-7 Site, Exterior Fence and Radioactive Markings

Figure 6.3. LF-7 Site, West Side Exterior Fence

Figure 6.4. LF-7 Site, South Side Exterior Fence and Radioactive Markings

Figure 6.5. LF-7 Site, North Side Exterior Fence and Radioactive Markings

Figure 6.6. LF-7 Site, Ludlum 2221 Scan w/GPS Unit

Figure 6.7. Borehole/Hand Auguring Process, Inside LF-7 Site

Figure 6.8. Example 2-ft-Deep Borehole, LF-7 Site

Figure 6.9. Ludlum 2221 and Ortec Detective EX, Borehole Static Measurements

Figure 6.10. Ludlum 2221 and Ortec Detective EX, Borehole Static Measurements

Figure 6.11. Large Auger for 6-ft Composite Samples

Figure 6.12a. Large Auger for 6-ft Composite Samples

Figure 6.12b. Large Auger for 6-ft Composite Samples

Figure 6.13. 6-ft Composite Samples

Figure 6.14. Composite Analysis Ortec Detective EX

Attachment 7

Environmental Sample Laboratory Results (pCi/g)

Table 7.1. Environmental Sample Locations

Sample ID	SAMNO	Base Sample	Location X (° W)	Location Y (° N)	Type	Depth (ft)
SCF-001	11200180	000GS001	-70.54727192960	41.67774211060	soil	0.5000
SCF-002	11200181	000GS002	-70.54727192960	41.67774211060	soil	1.0000
SCF-003	11200182	000GS003	-70.54727192960	41.67774211060	soil	2.0000
SCF-004	11200183	000GS004	-70.54724930610	41.67773456290	soil	0.5000
SCF-005	11200184	000GS005	-70.54724930610	41.67773456290	soil	1.0000
SCF-006	11200185	000GS006	-70.54724930610	41.67773456290	soil	2.0000
SCF-007	11200186	000GS007	-70.54722719650	41.67772740490	soil	0.5000
SCF-008	11200187	000GS008	-70.54722719650	41.67772740490	soil	1.0000
SCF-009	11200188	000GS009	-70.54722719650	41.67772740490	soil	2.0000
SCF-013	11200189	000GS013	-70.54726666740	41.67772693500	soil	0.5000
SCF-014	11200190	000GS014	-70.54726666740	41.67772693500	soil	1.0000
SCF-015	11200191	000GS015	-70.54726666740	41.67772693500	soil	2.0000
SCF-016	11200192	000CS016	-70.54726850740	41.67771094080	soil	6.0000
SCF-017	11200193	000CS017	-70.54727027470	41.67771055610	soil	6.0000
SCF-018	11200194	000CS018	-70.54724553880	41.67772408890	soil	6.0000
SCF-019	11200195	000CS019	-70.54724590610	41.67772169950	soil	6.0000
SCF-020	11200196	000CS020	-70.54722617830	41.67772153110	soil	6.0000
SCF-021	11200197	000CS021	-70.54722803210	41.67771992210	soil	6.0000
SCF-022	11200198	000CS022	-70.54723701030	41.67770049780	soil	6.0000
SCF-023	11200199	000CS023	-70.54723774920	41.67769825440	soil	6.0000
SCF-024	11200200	000CS024	-70.54724866640	41.67771094360	soil	6.0000
SCF-025	11200201	000CS025	-70.54724923700	41.67770904830	soil	6.0000
SCF-026	11200202	000CS026	-70.54726594110	41.67772769440	soil	6.0000
SCF-027	11200203	000CS027	-70.54726679670	41.67772513690	soil	6.0000
SCF-028	11200204	000CS028	-70.54726081790	41.67773731490	soil	6.0000
SCF-029	11200205	000CS029	-70.54725918650	41.67773458320	soil	6.0000
SCF-030	11200206	000CS030	-70.54722697310	41.67775858440	soil	6.0000
SCF-031	11200207	000CS031	-70.54722476000	41.67775888910	soil	6.0000
SCF-032	11200208	000CS032	-70.54729151940	41.67774142120	soil	6.0000
SCF-033	11200209	000CS033	-70.54729545820	41.67774092030	soil	6.0000
SCF-034	11200210	000GS034	-70.54726740880	41.67772763450	soil	0.5000
SCF-035	11200211	000GS035	-70.54726458360	41.67773031860	soil	1.0000
SCF-036	11200212	000GS036	-70.54726405060	41.67772528890	soil	2.0000
SCF-037	11200213	000GS037	-70.54717314260	41.67773804370	soil	0.5000
SCF-038	11200214	000GS038	-70.54717038350	41.67773682140	soil	1.0000
SCF-039	11200215	000GS039	-70.54717156820	41.67773475940	soil	2.0000
SCF-040	11200216	000GS040	-70.54717133530	41.67776006170	soil	0.5000
SCF-041	11200217	000GS041	-70.54716809950	41.67776277790	soil	1.0000
SCF-042	11200218	000GS042	-70.54717231950	41.67776355010	soil	2.0000
SCF-043	11200219	000GS043	-70.54724499600	41.67771635060	soil	0.5000
SCF-044	11200220	000GS044	-70.54724281290	41.67771984410	soil	1.0000
SCF-045	11200221	000GS045	-70.54724661330	41.67772053980	soil	2.0000
SCF-046	11200222	000GS046	-70.54746262120	41.67761015990	soil	0.5000

Table 7.1. Environmental Sample Locations (concluded)

Sample ID	SAMNO	Base Sample	Location X (° W)	Location Y (° N)	Type	Depth (ft)
SCF-047	11200223	000GS047	-70.54745895850	41.67761446570	soil	1.0000
SCF-048	11200224	000GS048	-70.54746430030	41.67761467400	soil	2.0000
SCF-049	11200225	000GS049	-70.54790899450	41.67836800000	soil	0.5000
SCF-050	11200226	000GS050	-70.54790405350	41.67836614230	soil	1.0000
SCF-051	11200227	000GS051	-70.54790325310	41.67836634080	soil	2.0000
SCF-052	11200228	000GV052	-70.54722363980	41.67774880380	Vegetation	surface
SCF-053	11200229	000GV053	-70.54722846190	41.67772012450	Vegetation	surface
SCF-054	11200230	000GV054	-70.54724240880	41.67768413270	Vegetation	surface
SCF-055	11200231	000GV055	-70.54786569070	41.67838208560	Vegetation	surface

Table 7.2. Environmental Sample Results

Sample ID	CS-137		Co-60		Ra-226		GA		GB		Tritium		Ni-63	
	Result	Uncertainty	Result	Uncertainty	Result	Uncertainty	Result	Uncertainty	Result	Uncertainty	Result	Uncertainty	Result	Uncertainty
SCF-001	0.2670	0.0945	0.0186	0.0446	0.9210	0.2240	11.7000	4.5100	21.8000	4.4800	0.8960	2.8100	0.2240	1.4400
SCF-002	0.3310	0.0805	0.0369	0.0367	1.1100	0.2040	16.4000	4.7300	22.1000	3.5000	0.3050	2.4800	0.4910	1.4300
SCF-003	0.2180	0.0880	0.0119	0.0502	0.7690	0.2190	14.8000	4.5700	20.6000	3.8900	0.5480	2.5900	0.0635	1.4100
SCF-004	0.2650	0.0724	0.0050	0.0404	0.9730	0.2160	11.8000	4.5900	24.2000	4.7500	0.3170	2.5800	0.1970	1.4700
SCF-005	0.2000	0.0719	0.0275	0.0442	1.1400	0.2030	15.3000	4.8700	16.9000	4.0000	0.0000	2.5400	0.7040	1.5400
SCF-006	0.1030	0.0969	0.0142	0.0329	1.0400	0.2200	23.2000	6.4200	21.4000	4.6300	1.2000	2.4700	0.3810	1.2400
SCF-007	0.1710	0.0993	0.0097	0.0521	0.8150	0.2830	8.4800	3.7700	18.4000	4.5500	0.2770	2.3300	0.0541	1.1300
SCF-008	0.1310	0.0708	0.0186	0.0381	1.1600	0.2410	21.9000	5.6600	29.2000	4.7500	0.0000	2.1200	0.9860	1.3100
SCF-009	0.1260	0.0938	0.0499	0.0691	1.4400	0.3080	22.0000	5.5100	29.1000	4.6500	1.7900	2.6200	0.0389	1.3600
SCF-013	0.1290	0.0546	0.0278	0.0421	1.2700	0.2030	19.4000	5.1600	30.7000	4.7600	1.2400	2.1200	0.1350	1.4200
SCF-014	0.3350	0.0962	0.0546	0.0509	0.9720	0.2260	12.2000	4.6200	28.9000	5.1500	0.6130	1.9800	0.7690	1.2600
SCF-015	0.2380	0.0916	0.0132	0.0536	1.1100	0.2580	14.0000	4.7800	22.7000	4.3000	0.6240	2.0200	0.0343	1.5300
SCF-016	0.1780	0.0897	0.0070	0.0356	0.8950	0.2200	19.4000	5.3100	23.1000	3.8100	0.0000	2.1400	0.6980	1.3800
SCF-017	0.2880	0.1600	0.0108	0.0621	1.0500	0.2370	16.6000	4.8500	32.2000	5.0300	0.6060	1.9600	0.2720	1.3600
SCF-018	0.2710	0.1340	0.0213	0.0738	1.0300	0.3090	14.7000	4.7700	26.4000	4.4000	1.1900	1.8300	0.2940	1.2000
SCF-019	0.3520	0.1000	0.0132	0.0469	0.8530	0.2160	25.1000	6.2500	23.7000	4.1600	0.8070	2.1800	0.0301	1.5800
SCF-020	0.3400	0.1140	0.0215	0.0439	1.0600	0.2060	17.1000	5.0200	26.6000	4.3600	0.0000	2.2300	0.0577	1.2100
SCF-021	0.3520	0.1120	0.0068	0.0497	1.0100	0.1950	16.4000	5.1000	21.5000	4.2200	2.4000	2.7300	0.4570	1.3100
SCF-022	0.2640	0.0891	0.0063	0.0421	1.0200	0.1760	19.8000	5.4400	28.5000	4.5900	0.3140	2.1100	0.0231	1.2100
SCF-023	0.2040	0.0923	0.0094	0.0403	1.1800	0.2830	12.4000	4.2000	28.5000	4.4800	1.6800	2.4600	0.1420	1.2400
SCF-024	0.2550	0.0791	0.0191	0.0400	1.0900	0.2020	8.7600	4.1400	18.2000	3.7000	0.7370	1.7700	0.4860	1.3000
SCF-025	0.2560	0.0823	0.0203	0.0369	0.8500	0.1860	5.4100	3.0300	19.2000	3.9200	0.1890	1.9200	0.9050	1.3200
SCF-026	0.3020	0.0902	0.0021	0.0407	0.9820	0.1970	12.7000	4.6700	19.7000	4.1600	0.5600	1.8200	0.9680	1.4700
SCF-027	0.3380	0.0997	0.0088	0.0429	0.8350	0.1890	11.2000	4.5000	12.7000	3.7000	0.5440	1.7700	0.3900	1.4500
SCF-028	0.3090	0.0819	0.0011	0.0386	0.8090	0.1740	15.7000	4.3800	35.1000	4.8300	0.3630	1.8100	0.5810	1.1400
SCF-029	0.2600	0.0749	0.0336	0.0428	0.9580	0.1910	6.0300	3.2800	20.5000	4.4000	0.5170	1.9600	1.2400	1.2200
SCF-030	0.1910	0.0815	0.0548	0.0474	0.9870	0.2160	11.0000	3.9400	20.4000	4.2300	0.0000	1.8800	0.5140	1.2900
SCF-031	0.2530	0.0569	0.0099	0.0302	0.8460	0.1800	13.3000	4.1800	20.9000	3.9800	0.0000	1.8500	0.5920	1.2400
SCF-032	0.3110	0.0852	0.0010	0.0400	0.7970	0.2220	12.4000	4.3000	16.5000	3.9400	1.0500	1.6600	1.3300	1.1700
SCF-033	0.2960	0.0788	0.0225	0.0362	0.7390	0.1670	10.7000	3.9500	21.0000	4.2000	0.3600	1.7900	0.7850	1.1500
SCF-034	0.2640	0.1220	0.0216	0.0706	1.1000	0.2490	14.2000	4.9400	30.3000	4.9800	0.8670	2.3400	0.8520	1.6200
SCF-035	0.1440	0.0636	0.0323	0.0577	1.1500	0.2440	14.6000	4.3700	29.8000	4.4100	0.6290	2.4900	0.0706	1.5700
SCF-036	0.0237	0.0470	0.0432	0.0438	1.3700	0.2180	13.9000	4.0600	30.1000	4.0500	0.8750	2.3600	0.1390	1.2300
SCF-037	0.0332	0.0585	0.0247	0.0583	0.9070	0.2140	13.8000	4.0600	24.3000	3.6500	0.3040	2.4700	0.2710	1.4900
SCF-038	0.0416	0.0413	0.0240	0.0385	0.9730	0.1930	19.6000	6.1200	22.5000	4.3400	0.9020	2.4400	1.4100	2.4300
SCF-039	0.0222	0.0417	0.0212	0.0461	0.8810	0.2170	11.8000	4.4000	22.1000	4.0500	1.7700	2.5900	0.1480	1.3000
SCF-040	0.1540	0.0762	0.0103	0.0341	0.6570	0.2000	12.5000	4.3400	19.2000	3.5300	1.7300	2.5300	0.3340	1.2600

Table 7.2. Environmental Sample Results (concluded)

SCF-041	0.1820	0.0643	0.0119	0.0355	0.7180	0.1790	9.8300	3.8900	12.5000	4.0900	0.2980	2.0100	0.0230	1.2100
SCF-042	0.3600	0.0859	0.0233	0.0421	0.8000	0.2330	12.5000	4.3000	22.4000	4.5500	0.0000	2.0600	0.0273	1.4300
SCF-043	0.2200	0.1020	0.0135	0.0619	1.0500	0.2370	23.3000	6.5000	35.6000	5.1400	2.1000	2.6800	1.4500	2.5100
SCF-044	0.1650	0.0840	0.0221	0.0371	1.1700	0.2020	16.8000	5.6700	25.7000	4.7200	0.5730	2.7000	0.4790	1.2300
SCF-045	0.2780	0.0936	0.0080	0.0141	0.8000	0.1940	14.0000	4.7900	21.4000	4.2100	0.5780	2.2900	0.6210	1.3600
SCF-046	0.0820	0.0552	0.0166	0.0492	0.0000	0.2340	16.6000	5.2300	24.2000	4.3200	0.6150	2.4300	0.2520	1.3900
SCF-047	0.1260	0.0469	0.0554	0.0497	0.8000	0.1980	14.8000	4.6800	17.2000	3.6600	0.0000	2.8000	0.1160	1.2900
SCF-048	0.1280	0.0810	0.0079	0.0451	0.9130	0.2460	13.0000	4.3600	16.1000	3.2600	0.0000	2.5000	0.8370	1.5300
SCF-049	0.0807	0.0486	0.0150	0.0416	0.8330	0.1890	13.7000	4.5100	25.9000	4.1300	0.0000	2.1800	0.2980	1.3400
SCF-050	0.1270	0.0538	0.0174	0.0426	0.8670	0.2020	9.1300	3.8600	23.2000	4.3000	3.1800	2.3800	0.2600	1.3600
SCF-051	0.0816	0.0536	0.0224	0.0335	0.6220	0.1440	14.8000	4.9500	24.8000	4.3400	0.5430	1.7700	0.1030	1.3400
SCF-052	0.2940	0.1290	0.0344	0.0771	0.0000	0.2840	19.0000	5.7000	20.8000	4.2200	0.1520	1.8600	0.6970	1.3600
SCF-053	0.3170	0.1070	0.0101	0.0471	0.7750	0.1930	11.7000	4.3900	18.5000	4.4600	0.1850	1.8700	0.6050	1.3900
SCF-054	0.2310	0.1030	0.0049	0.0524	1.0600	0.2560	24.7000	6.0800	27.2000	4.6100	0.8850	2.0300	0.4060	1.2500
SCF-055	0.0076	0.0726	0.0481	0.0798	0.0000	0.2160	6.2900	3.0800	8.5000	3.0200	2.1700	2.2900	0.0296	1.2500

Attachment 8

Laboratory Results

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433
Report Date: September 20, 2012
Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200205
Sample ID: 309956001
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 3.78%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.260	+/-0.0749	0.0777			0.100	pCi/g		MXR1	09/17/12	1002	1241404	1
Cobalt-60	U	0.0336	+/-0.0428	0.0954				pCi/g						
Radium-226		0.958	+/-0.191	0.117				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		6.03	+/-3.28	3.48	1.17	+/-3.48	4.00	pCi/g		BXF1	09/06/12	1647	1241367	2
Beta		20.5	+/-4.40	5.06	2.30	+/-5.34	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.517	+/-1.96	3.65	1.57	+/-1.96	6.00	pCi/g		BYS1	09/14/12	1929	1242252	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	1.24	+/-1.22	2.04	0.976	+/-1.24	4.00	pCi/g		TYJ1	09/19/12	0052	1245872	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1541	1241164

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1245872	68.3	(25%-125%)

Notes:

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200206
Sample ID: 309956002
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 2.22%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.191	+/-0.0815	0.113			0.100	pCi/g		MXR1	09/17/12	1009	1241404	1
Cobalt-60	U	-0.0548	+/-0.0474	0.0724				pCi/g						
Radium-226		0.987	+/-0.216	0.159				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		11.0	+/-3.94	2.89	0.936	+/-4.49	4.00	pCi/g		BXF1	09/06/12	1658	1241367	2
Beta		20.4	+/-4.23	4.61	2.08	+/-5.15	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.00	+/-1.88	3.68	1.58	+/-1.88	6.00	pCi/g		BYS1	09/14/12	1946	1242252	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.514	+/-1.29	2.22	1.06	+/-1.29	4.00	pCi/g		TYJ1	09/19/12	0108	1245872	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1541	1241164

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1245872	68.7	(25%-125%)

Notes:

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200207
Sample ID: 309956003
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 1.96%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.253	+/-0.0569	0.0651			0.100	pCi/g		MXR1	09/17/12	1055	1241404	1
Cobalt-60	U	-0.00986	+/-0.0302	0.056				pCi/g						
Radium-226		0.846	+/-0.180	0.102				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		13.3	+/-4.18	3.84	1.50	+/-4.88	4.00	pCi/g		BXF1	09/06/12	1649	1241367	2
Beta		56.0	+/-5.34	3.22	1.43	+/-9.36	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.00	+/-1.85	3.62	1.55	+/-1.85	6.00	pCi/g		BYS1	09/14/12	2004	1242252	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.592	+/-1.24	2.12	1.01	+/-1.24	4.00	pCi/g		TYJ1	09/19/12	0124	1245872	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1541	1241164

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1245872	70.5	(25%-125%)

Notes:

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200208
Sample ID: 309956004
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 1.97%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.311	+/-0.0852	0.107			0.100	pCi/g		MXR1	09/17/12	1358	1241404	1
Cobalt-60	U	-0.000956	+/-0.040	0.0846				pCi/g						
Radium-226		0.797	+/-0.222	0.204				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		12.4	+/-4.30	3.02	0.969	+/-4.94	4.00	pCi/g		BXF1	09/06/12	1658	1241367	2
Beta		16.5	+/-3.94	4.55	2.05	+/-4.60	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-1.05	+/-1.66	3.62	1.55	+/-1.66	6.00	pCi/g		BYS1	09/14/12	2021	1242252	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	1.33	+/-1.17	1.94	0.927	+/-1.20	4.00	pCi/g		TYJ1	09/19/12	0141	1245872	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1541	1241164

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1245872	72.8	(25%-125%)

Notes:

GEL LABORATORIES LLC
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Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200209
Sample ID: 309956005
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 2.05%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.296	+/-0.0788	0.0757			0.100	pCi/g		MXR1	09/18/12	0618	1241404	1
Cobalt-60	U	0.0225	+/-0.0362	0.0775				pCi/g						
Radium-226		0.739	+/-0.167	0.114				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		10.7	+/-3.95	2.72	0.829	+/-4.48	4.00	pCi/g		BXF1	09/06/12	1658	1241367	2
Beta		21.0	+/-4.20	4.45	2.00	+/-5.23	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.36	+/-1.79	3.63	1.56	+/-1.79	6.00	pCi/g		BYS1	09/14/12	2040	1242252	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.785	+/-1.15	1.95	0.929	+/-1.16	4.00	pCi/g		TYJ1	09/19/12	0157	1245872	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1541	1241164

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1245872	69.8	(25%-125%)

Notes:

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: September 20, 2012

Client : Radiation Laboratories - WPAFB
2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio
Contact: Capt. Eric Weatherholt

Workorder: 309956

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1241404										
QC1202727405 309956001 DUP										
Cesium-137		0.260		0.331	pCi/g	24.1		(0% - 100%)	MXR1	09/18/1206:25
Uncert:		+/-0.0749		+/-0.0884						
Cobalt-60	U	0.0336	U	-0.0134	pCi/g	0		N/A		
Uncert:		+/-0.0428		+/-0.0391						
Radium-226		0.958		0.644	pCi/g	39.1*		(0% - 20%)		
Uncert:		+/-0.191		+/-0.162						
QC1202727406 LCS										
Americium-241	536			592	pCi/g		110	(75%-125%)		09/18/1207:17
Uncert:				+/-49.4						
Cesium-137	195			194	pCi/g		99.3	(75%-125%)		
Uncert:				+/-16.0						
Cobalt-60	224			226	pCi/g		101	(75%-125%)		
Uncert:				+/-21.5						
Radium-226			U	0.0517	pCi/g					
Uncert:				+/-0.624						
QC1202727404 MB										
Cesium-137			U	-0.00252	pCi/g					09/18/1206:19
Uncert:				+/-0.0212						
Cobalt-60			U	-0.01	pCi/g					
Uncert:				+/-0.0188						
Radium-226			U	-0.0214	pCi/g					
Uncert:				+/-0.0512						
Rad Gas Flow										
Batch 1241367										
QC1202727333 309956001 DUP										
Alpha		6.03		10.2	pCi/g	51.8		(0% - 100%)	BXF1	09/06/1216:48
Uncert:		+/-3.28		+/-3.79						
TPU:		+/-3.48		+/-4.29						
Beta		20.5		12.8	pCi/g	46		(0% - 100%)		
Uncert:		+/-4.40		+/-3.25						
TPU:		+/-5.34		+/-3.71						
QC1202727336 LCS										
Alpha	95.5			99.3	pCi/g		104	(75%-125%)		09/06/1217:11
Uncert:				+/-9.59						
TPU:				+/-21.1						
Beta	396			440	pCi/g		111	(75%-125%)		
Uncert:				+/-14.8						
TPU:				+/-61.1						
QC1202727332 MB										
Alpha			U	-0.528	pCi/g					09/06/1216:48
Uncert:				+/-0.921						
TPU:				+/-0.922						

QC Summary

Workorder: 309956

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 1241367										
Beta			U	0.286	pCi/g					
	Uncert:			+/-1.88						
	TPU:			+/-1.88						
QC1202727334 309956001 MS										
Alpha	119	6.03		130	pCi/g		104	(75%-125%)		09/06/1216:48
	Uncert:	+/-3.28		+/-14.2						
	TPU:	+/-3.48		+/-29.1						
Beta	494	20.5		497	pCi/g		96.4	(75%-125%)		
	Uncert:	+/-4.40		+/-17.8						
	TPU:	+/-5.34		+/-74.1						
QC1202727335 309956001 MSD										
Alpha	95.5	6.03		92.2	pCi/g	34*	90.2	(0%-20%)		09/06/1216:48
	Uncert:	+/-3.28		+/-10.7						
	TPU:	+/-3.48		+/-20.5						
Beta	396	20.5		368	pCi/g	29.9*	87.7	(0%-20%)		
	Uncert:	+/-4.40		+/-13.8						
	TPU:	+/-5.34		+/-51.4						
Rad Liquid Scintillation										
Batch 1242252										
QC1202729563 309955036 DUP										
Tritium	U	1.24	U	-0.905	pCi/g	0			N/A BYS1	09/14/1221:15
	Uncert:	+/-2.12		+/-1.75						
	TPU:	+/-2.14		+/-1.75						
QC1202729565 LCS										
Tritium	29.8			30.4	pCi/g		102	(75%-125%)		09/14/1221:50
	Uncert:			+/-4.74						
	TPU:			+/-8.37						
QC1202729562 MB										
Tritium			U	0.675	pCi/g					09/14/1220:57
	Uncert:			+/-1.92						
	TPU:			+/-1.93						
QC1202729564 309955036 MS										
Tritium	31.2 U	1.24		36.2	pCi/g		116	(75%-125%)		09/14/1221:32
	Uncert:	+/-2.12		+/-5.35						
	TPU:	+/-2.14		+/-9.81						
Batch 1245872										
QC1202738003 309955041 DUP										
Nickel-63	U	0.406	U	1.98	pCi/g	0			N/A TYJ1	09/19/1202:29
	Uncert:	+/-1.25		+/-1.33						
	TPU:	+/-1.26		+/-1.37						
QC1202738005 LCS										
Nickel-63	61.6			64.3	pCi/g		104	(75%-125%)		09/19/1203:01
	Uncert:			+/-2.77						
	TPU:			+/-12.1						
QC1202738002 MB										
Nickel-63			U	0.623	pCi/g					09/19/1202:13
	Uncert:			+/-1.07						
	TPU:			+/-1.07						
QC1202738004 309955041 MS										

QC Summary

Workorder: 309956

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Liquid Scintillation										
Batch 1245872										
Nickel-63	68.9	0.406	U	73.7	pCi/g		107	(75%-125%)		
	Uncert:	+/-1.25		+/-3.42						
	TPU:	+/-1.26		+/-14.0						

Notes:
The Qualifiers in this report are defined as follows:

**	Analyte is a surrogate compound
<	Result is less than value reported
>	Result is greater than value reported
A	The TIC is a suspected aldol-condensation product
B	For General Chemistry and Organic analysis the target analyte was detected in the associated blank.
BD	Results are either below the MDC or tracer recovery is low
C	Analyte has been confirmed by GC/MS analysis
D	Results are reported from a diluted aliquot of the sample
F	Estimated Value
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD
M	Matrix Related Failure
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.
UI	Gamma Spectroscopy--Uncertain identification
UJ	Gamma Spectroscopy--Uncertain identification
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	QC Samples were not spiked with this compound
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
h	Preparation or preservation holding time was exceeded

QC Summary

Workorder: 309956

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
** Indicates analyte is a surrogate/tracer compound.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

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Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433
Report Date: September 20, 2012
Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200180
Sample ID: 309955001
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 4.53%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Americium-241	U	0.306	+/-0.296	0.543				pCi/g		MXR1	09/18/12	0604	1241405	1
Cesium-137		0.267	+/-0.0945	0.0715			0.100	pCi/g						
Cobalt-60	U	-0.0186	+/-0.0446	0.0837				pCi/g						
Radium-226		0.921	+/-0.224	0.170				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		11.7	+/-4.51	3.56	1.16	+/-5.08	4.00	pCi/g		BXF1	09/07/12	1211	1241369	2
Beta		21.8	+/-4.48	4.91	2.22	+/-5.43	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.896	+/-2.81	5.29	2.20	+/-2.82	6.00	pCi/g		BYS1	09/13/12	1222	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.224	+/-1.44	2.49	1.20	+/-1.44	4.00	pCi/g		TYJ1	09/13/12	1404	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	60.0	(25%-125%)

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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200180
Sample ID: 309955001

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	**Test**							**Batch ID**		**Recovery%**	**Acceptable Limits**			

Notes:

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Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200181
Sample ID: 309955002
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 2.91%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.331	+/-0.0802	0.0805			0.100	pCi/g		MXR1	09/18/12	0605	1241405	1
Cobalt-60	U	0.0369	+/-0.0367	0.0845				pCi/g						
Radium-226		1.11	+/-0.204	0.118				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		16.4	+/-4.73	3.92	1.50	+/-5.85	4.00	pCi/g		BXF1	09/06/12	1817	1241369	2
Beta		22.1	+/-3.50	3.60	1.65	+/-4.61	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.305	+/-2.48	5.15	2.14	+/-2.48	6.00	pCi/g		BYS1	09/13/12	1240	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.491	+/-1.43	2.54	1.22	+/-1.43	4.00	pCi/g		TYJ1	09/13/12	1425	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	61.2	(25%-125%)

Notes:

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Company : Radiation Laboratories - WPAFB
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200182
Sample ID: 309955003
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 3.9%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.218	+/-0.088	0.0961			0.100	pCi/g		MXR1	09/18/12	0606	1241405	1
Cobalt-60	U	0.0119	+/-0.0502	0.107				pCi/g						
Radium-226		0.796	+/-0.219	0.182				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		14.8	+/-4.57	2.85	0.924	+/-5.41	4.00	pCi/g		BXF1	09/09/12	1226	1241369	2
Beta		20.6	+/-3.89	3.62	1.60	+/-4.83	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.548	+/-2.59	4.99	2.07	+/-2.59	6.00	pCi/g		BYS1	09/13/12	1257	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.0635	+/-1.41	2.47	1.19	+/-1.41	4.00	pCi/g		TYJ1	09/13/12	1446	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	61.5	(25%-125%)

Notes:

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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200183
Sample ID: 309955004
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 2.93%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.265	+/-0.0724	0.0649			0.100	pCi/g		MXR1	09/18/12	0606	1241405	1
Cobalt-60	U	0.00499	+/-0.0404	0.0763				pCi/g						
Radium-226		0.973	+/-0.216	0.121				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		11.8	+/-4.59	3.45	1.09	+/-5.09	4.00	pCi/g		BXF1	09/06/12	1817	1241369	2
Beta		24.2	+/-4.75	4.92	2.21	+/-5.63	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.317	+/-2.58	5.35	2.22	+/-2.58	6.00	pCi/g		BYS1	09/13/12	1315	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.197	+/-1.47	2.55	1.22	+/-1.47	4.00	pCi/g		TYJ1	09/13/12	1507	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	58.5	(25%-125%)

Notes:

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Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200184
Sample ID: 309955005
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 4.44%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.200	+/-0.0719	0.0896			0.100	pCi/g		MXR1	09/18/12	0607	1241405	1
Cobalt-60	U	0.0275	+/-0.0442	0.0935				pCi/g						
Radium-226		1.14	+/-0.203	0.159				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		15.3	+/-4.87	3.05	0.951	+/-5.72	4.00	pCi/g		BXF1	09/07/12	1211	1241369	2
Beta		16.9	+/-4.00	4.74	2.15	+/-4.63	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.00	+/-2.54	5.13	2.13	+/-2.54	6.00	pCi/g		BYS1	09/13/12	1332	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.704	+/-1.54	2.74	1.31	+/-1.54	4.00	pCi/g		TYJ1	09/13/12	1528	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	57.4	(25%-125%)

Notes:

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Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200210
Sample ID: 309955006
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 6.8%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.264	+/-0.122	0.115			0.100	pCi/g		MXR1	09/18/12	0714	1241405	1
Cobalt-60	U	0.0216	+/-0.0706	0.147				pCi/g						
Radium-226		1.10	+/-0.249	0.195				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		14.2	+/-4.94	3.72	1.25	+/-5.64	4.00	pCi/g		BXF1	09/06/12	1817	1241369	2
Beta		30.3	+/-4.98	5.01	2.28	+/-6.70	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.867	+/-2.34	5.12	2.13	+/-2.34	6.00	pCi/g		BYS1	09/13/12	1350	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.852	+/-1.62	2.76	1.33	+/-1.63	4.00	pCi/g		TYJ1	09/13/12	1549	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	58.2	(25%-125%)

Notes:

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Certificate of Analysis

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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200211
Sample ID: 309955007
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 2.98%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.144	+/-0.0636	0.103			0.100	pCi/g		MXR1	09/18/12	0821	1241405	1
Cobalt-60	U	0.0323	+/-0.0577	0.126				pCi/g						
Radium-226		1.15	+/-0.244	0.191				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		14.6	+/-4.37	2.86	0.954	+/-5.21	4.00	pCi/g		BXF1	09/06/12	1817	1241369	2
Beta		29.8	+/-4.41	4.67	2.17	+/-6.03	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.629	+/-2.49	5.31	2.21	+/-2.49	6.00	pCi/g		BYS1	09/13/12	1407	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.0706	+/-1.57	2.74	1.32	+/-1.57	4.00	pCi/g		TYJ1	09/13/12	1611	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	59.3	(25%-125%)

Notes:

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Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200212
Sample ID: 309955008
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 3.18%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137	U	0.0237	+/-0.047	0.0896			0.100	pCi/g		MXR1	09/18/12	0841	1241405	1
Cobalt-60	U	-0.0432	+/-0.0438	0.0697				pCi/g						
Radium-226		1.37	+/-0.218	0.134				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		13.9	+/-4.06	2.48	0.801	+/-4.85	4.00	pCi/g		BXF1	09/06/12	1818	1241369	2
Beta		30.1	+/-4.05	3.28	1.47	+/-5.78	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.875	+/-2.36	5.17	2.15	+/-2.36	6.00	pCi/g		BYS1	09/13/12	1425	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.139	+/-1.23	2.16	1.04	+/-1.23	4.00	pCi/g		TYJ1	09/13/12	1632	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	62.3	(25%-125%)

Notes:

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Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200213
Sample ID: 309955009
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 1.63%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137	U	0.0332	+/-0.0585	0.119			0.100	pCi/g		MXR1	09/18/12	0923	1241405	1
Cobalt-60	U	-0.0247	+/-0.0583	0.107				pCi/g						
Radium-226		0.907	+/-0.214	0.175				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		13.8	+/-4.06	3.97	1.63	+/-4.84	4.00	pCi/g		BXF1	09/06/12	1818	1241369	2
Beta		24.3	+/-3.65	3.44	1.56	+/-4.92	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.304	+/-2.47	5.13	2.13	+/-2.47	6.00	pCi/g		BYS1	09/13/12	1442	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.271	+/-1.49	2.63	1.26	+/-1.49	4.00	pCi/g		TYJ1	09/13/12	1653	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	62.3	(25%-125%)

Notes:

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Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200214
Sample ID: 309955010
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 2.08%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137	U	0.0416	+/-0.0413	0.0831			0.100	pCi/g		MXR1	09/18/12	0950	1241405	1
Cobalt-60	U	-0.024	+/-0.0385	0.0665				pCi/g						
Radium-226		0.973	+/-0.193	0.0997				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		19.6	+/-6.12	2.90	0.720	+/-7.23	4.00	pCi/g		BXF1	09/06/12	1817	1241369	2
Beta		22.5	+/-4.34	4.29	1.91	+/-5.36	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.902	+/-2.44	5.33	2.22	+/-2.44	6.00	pCi/g		BYS1	09/13/12	1500	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.438	+/-1.41	2.43	1.17	+/-1.41	4.00	pCi/g		TYJ1	09/13/12	1714	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	63.0	(25%-125%)

Notes:

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Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433
Report Date: September 20, 2012
Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200220
Sample ID: 309955011
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 3.23%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.165	+/-0.084	0.0693			0.100	pCi/g		MXR1	09/18/12	1126	1241405	1
Cobalt-60	U	-0.0221	+/-0.0371	0.0643				pCi/g						
Radium-226		1.17	+/-0.202	0.127				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		16.8	+/-5.67	4.17	1.47	+/-6.69	4.00	pCi/g		BXF1	09/06/12	1819	1241369	2
Beta		25.7	+/-4.72	4.43	1.96	+/-5.96	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.573	+/-2.70	5.21	2.16	+/-2.70	6.00	pCi/g		BYS1	09/13/12	1517	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.479	+/-1.23	2.19	1.05	+/-1.23	4.00	pCi/g		TYJ1	09/13/12	1735	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	63.0	(25%-125%)

Notes:

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Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200221
Sample ID: 309955012
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 3.32%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.278	+/-0.0936	0.0599			0.100	pCi/g		MXR1	09/18/12	1206	1241405	1
Cobalt-60	U	0.00802	+/-0.0414	0.0842				pCi/g						
Radium-226		0.800	+/-0.194	0.125				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		14.0	+/-4.79	3.13	0.966	+/-5.51	4.00	pCi/g		BXF1	09/06/12	1819	1241369	2
Beta		21.4	+/-4.21	3.92	1.72	+/-5.26	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.578	+/-2.29	4.88	2.03	+/-2.29	6.00	pCi/g		BYS1	09/13/12	1535	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.621	+/-1.36	2.41	1.16	+/-1.36	4.00	pCi/g		TYJ1	09/13/12	1756	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	59.3	(25%-125%)

Notes:

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Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200222
Sample ID: 309955013
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 9.52%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137	U	0.082	+/-0.0552	0.113			0.100	pCi/g		MXR1	09/18/12	1210	1241405	1
Cobalt-60	U	-0.0166	+/-0.0492	0.089				pCi/g						
Radium-226	UI	0.00	+/-0.234	0.410				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		16.6	+/-5.23	3.59	1.21	+/-6.16	4.00	pCi/g		BXF1	09/06/12	1820	1241369	2
Beta		339	+/-14.3	3.13	1.33	+/-48.7	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.615	+/-2.43	5.19	2.16	+/-2.43	6.00	pCi/g		BYS1	09/13/12	1552	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.252	+/-1.39	2.45	1.18	+/-1.39	4.00	pCi/g		TYJ1	09/13/12	1818	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	59.7	(25%-125%)

Notes:

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Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200223
Sample ID: 309955014
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 8.36%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.126	+/-0.0469	0.0738			0.100	pCi/g		MXR1	09/18/12	1211	1241405	1
Cobalt-60	U	0.0554	+/-0.0497	0.103				pCi/g						
Radium-226		0.800	+/-0.198	0.144				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		14.8	+/-4.68	2.53	0.709	+/-5.46	4.00	pCi/g		BXF1	09/06/12	1820	1241369	2
Beta		17.2	+/-3.66	3.36	1.45	+/-4.39	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.00	+/-2.50	5.04	2.09	+/-2.50	6.00	pCi/g		BYS1	09/13/12	1610	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.116	+/-1.29	2.26	1.09	+/-1.29	4.00	pCi/g		TYJ1	09/13/12	1839	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	60.4	(25%-125%)

Notes:

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Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200224
Sample ID: 309955015
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 7.32%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.128	+/-0.081	0.0945			0.100	pCi/g		MXR1	09/18/12	1212	1241405	1
Cobalt-60	U	0.00789	+/-0.0451	0.0971				pCi/g						
Radium-226		0.913	+/-0.246	0.154				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		13.0	+/-4.36	2.82	0.869	+/-5.02	4.00	pCi/g		BXF1	09/06/12	1820	1241369	2
Beta		16.1	+/-3.26	2.48	1.03	+/-3.96	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.00	+/-2.50	5.05	2.10	+/-2.50	6.00	pCi/g		BYS1	09/13/12	1627	1242250	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.837	+/-1.53	2.60	1.25	+/-1.53	4.00	pCi/g		TYJ1	09/13/12	1900	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	59.3	(25%-125%)

Notes:

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Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200225
Sample ID: 309955016
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 1.14%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137	U	0.0807	+/-0.0486	0.106			0.100	pCi/g		MXR1	09/18/12	1232	1241405	1
Cobalt-60	U	0.015	+/-0.0416	0.0886				pCi/g						
Radium-226		0.833	+/-0.189	0.148				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		13.7	+/-4.51	3.10	1.01	+/-5.21	4.00	pCi/g		BXF1	09/06/12	1820	1241369	2
Beta		25.9	+/-4.13	3.08	1.33	+/-5.47	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.00	+/-2.18	4.56	1.83	+/-2.19	6.00	pCi/g		BYS1	09/13/12	1814	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.298	+/-1.34	2.32	1.11	+/-1.34	4.00	pCi/g		TYJ1	09/13/12	1921	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	58.2	(25%-125%)

Notes:

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Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200190
Sample ID: 309955017
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 5.04%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.335	+/-0.0962	0.0771			0.100	pCi/g		MXR1	09/18/12	1232	1241405	1
Cobalt-60	U	-0.0546	+/-0.0509	0.0761				pCi/g						
Radium-226		0.972	+/-0.226	0.165				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		12.2	+/-4.62	3.48	1.12	+/-5.20	4.00	pCi/g		BXF1	09/06/12	1842	1241369	2
Beta		28.9	+/-5.15	5.25	2.38	+/-6.60	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.613	+/-1.98	4.48	1.80	+/-1.98	6.00	pCi/g		BYS1	09/13/12	1832	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.769	+/-1.26	2.14	1.03	+/-1.26	4.00	pCi/g		TYJ1	09/13/12	1942	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	57.8	(25%-125%)

Notes:

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Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200191
Sample ID: 309955018
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 4.35%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.238	+/-0.122	0.0916			0.100	pCi/g		MXR1	09/18/12	1237	1241405	1
Cobalt-60	U	0.0132	+/-0.0536	0.115				pCi/g						
Radium-226		1.11	+/-0.258	0.197				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		14.0	+/-4.78	3.12	0.963	+/-5.42	4.00	pCi/g		BXF1	09/06/12	1842	1241369	2
Beta		22.7	+/-4.30	3.75	1.63	+/-5.18	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.624	+/-2.02	4.56	1.83	+/-2.02	6.00	pCi/g		BYS1	09/13/12	1850	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.0343	+/-1.53	2.67	1.28	+/-1.53	4.00	pCi/g		TYJ1	09/13/12	2003	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	52.5	(25%-125%)

Notes:

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Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200192
Sample ID: 309955019
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 3.83%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.178	+/-0.0897	0.0793			0.100	pCi/g		MXR1	09/18/12	1238	1241405	1
Cobalt-60	U	0.00703	+/-0.0356	0.0761				pCi/g						
Radium-226		0.895	+/-0.220	0.148				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		19.4	+/-5.31	2.74	0.823	+/-6.47	4.00	pCi/g		BXF1	09/06/12	1843	1241369	2
Beta		23.1	+/-3.81	2.82	1.21	+/-4.98	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.00	+/-2.14	4.46	1.79	+/-2.14	6.00	pCi/g		BYS1	09/13/12	1907	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.698	+/-1.38	2.36	1.13	+/-1.39	4.00	pCi/g		TYJ1	09/13/12	2024	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	64.9	(25%-125%)

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Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt

Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200193
Sample ID: 309955020
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 4%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.288	+/-0.160	0.0982			0.100	pCi/g		MXR1	09/18/12	1238	1241405	1
Cobalt-60	U	-0.0108	+/-0.0621	0.120				pCi/g						
Radium-226		1.05	+/-0.237	0.161				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		16.6	+/-4.85	2.97	0.964	+/-5.83	4.00	pCi/g		BXF1	09/07/12	1014	1241369	2
Beta		32.2	+/-5.03	4.71	2.13	+/-6.85	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.606	+/-1.96	4.42	1.78	+/-1.96	6.00	pCi/g		BYS1	09/13/12	1925	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.272	+/-1.36	2.35	1.13	+/-1.36	4.00	pCi/g		TYJ1	09/13/12	2046	1242225	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1304	1241160

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242225	63.0	(25%-125%)

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Wright Patterson AFB, Ohio 45433
Report Date: September 20, 2012
Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200194
Sample ID: 309955021
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 3.37%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.271	+/-0.134	0.127			0.100	pCi/g		MXR1	09/18/12	1244	1241406	1
Cobalt-60	U	-0.0213	+/-0.0738	0.136				pCi/g						
Radium-226		1.03	+/-0.309	0.195				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		14.7	+/-4.77	3.49	1.20	+/-5.53	4.00	pCi/g		DYT1	09/12/12	1332	1244480	2
Beta		26.4	+/-4.40	3.92	1.74	+/-5.73	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-1.19	+/-1.83	4.51	1.82	+/-1.83	6.00	pCi/g		BYS1	09/13/12	1942	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.294	+/-1.20	2.20	1.02	+/-1.20	4.00	pCi/g		TYJ1	09/13/12	1025	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	56.3	(25%-125%)

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Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200195
Sample ID: 309955022
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 3.46%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.352	+/-0.100	0.0814			0.100	pCi/g		MXR1	09/18/12	1318	1241406	1
Cobalt-60	U	-0.0132	+/-0.0469	0.0906				pCi/g						
Radium-226		0.853	+/-0.216	0.181				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		25.1	+/-6.25	3.16	0.995	+/-7.93	4.00	pCi/g		DYT1	09/12/12	1331	1244480	2
Beta		23.7	+/-4.16	3.01	1.26	+/-5.36	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.807	+/-2.18	4.12	1.66	+/-2.19	6.00	pCi/g		BYS1	09/13/12	2000	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.0301	+/-1.58	2.73	1.32	+/-1.58	4.00	pCi/g		TYJ1	09/13/12	2003	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	28.5	(25%-125%)

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Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200196
Sample ID: 309955023
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 3.6%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.340	+/-0.114	0.0739			0.100	pCi/g		MXR1	09/18/12	1318	1241406	1
Cobalt-60	U	0.0215	+/-0.0439	0.0921				pCi/g						
Radium-226		1.06	+/-0.206	0.134				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		17.1	+/-5.02	3.86	1.43	+/-6.03	4.00	pCi/g		DYT1	09/12/12	1331	1244480	2
Beta		26.6	+/-4.36	3.83	1.70	+/-5.72	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.00	+/-2.23	4.66	1.87	+/-2.23	6.00	pCi/g		BYS1	09/13/12	2017	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.0577	+/-1.21	2.09	1.02	+/-1.21	4.00	pCi/g		TYJ1	09/13/12	2105	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	35.6	(25%-125%)

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Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200197
Sample ID: 309955024
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 2.59%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.352	+/-0.112	0.0797			0.100	pCi/g		MXR1	09/18/12	1319	1241406	1
Cobalt-60	U	0.00681	+/-0.0497	0.096				pCi/g						
Radium-226		1.01	+/-0.195	0.158				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		16.4	+/-5.10	3.46	1.16	+/-5.99	4.00	pCi/g		DYT1	09/12/12	1331	1244480	2
Beta		21.5	+/-4.22	4.12	1.84	+/-5.28	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	2.40	+/-2.73	4.54	1.83	+/-2.78	6.00	pCi/g		BYS1	09/13/12	2035	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.457	+/-1.31	2.24	1.09	+/-1.31	4.00	pCi/g		TYJ1	09/13/12	2206	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	33.8	(25%-125%)

Notes:

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Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200198
Sample ID: 309955025
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 3.18%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.264	+/-0.0891	0.0636			0.100	pCi/g		MXR1	09/18/12	1319	1241406	1
Cobalt-60	U	-0.00626	+/-0.0421	0.078				pCi/g						
Radium-226		1.02	+/-0.176	0.133				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		19.8	+/-5.44	3.07	0.993	+/-6.69	4.00	pCi/g		DYT1	09/12/12	1332	1244480	2
Beta		28.5	+/-4.59	3.87	1.70	+/-6.08	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.314	+/-2.11	4.58	1.84	+/-2.11	6.00	pCi/g		BYS1	09/13/12	2052	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.0231	+/-1.21	2.09	1.02	+/-1.21	4.00	pCi/g		TYJ1	09/13/12	2308	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	34.1	(25%-125%)

Notes:

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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200199
Sample ID: 309955026
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 2.72%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.204	+/-0.0923	0.083			0.100	pCi/g		MXR1	09/18/12	1336	1241406	1
Cobalt-60	U	-0.00943	+/-0.0403	0.0789				pCi/g						
Radium-226		1.18	+/-0.238	0.156				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		12.4	+/-4.20	2.81	0.908	+/-4.88	4.00	pCi/g		DYT1	09/12/12	1332	1244480	2
Beta		28.5	+/-4.48	3.64	1.60	+/-5.96	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	1.68	+/-2.46	4.29	1.73	+/-2.48	6.00	pCi/g		BYS1	09/13/12	2110	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.142	+/-1.24	2.14	1.04	+/-1.24	4.00	pCi/g		TYJ1	09/14/12	0117	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	34.1	(25%-125%)

Notes:

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Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200215
Sample ID: 309955027
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 3.01%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137	U	0.0222	+/-0.0417	0.0845			0.100	pCi/g		MXR1	09/18/12	1337	1241406	1
Cobalt-60	U	-0.0212	+/-0.0461	0.0822				pCi/g						
Radium-226		0.881	+/-0.217	0.157				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		11.8	+/-4.40	3.27	1.05	+/-4.96	4.00	pCi/g		DYT1	09/12/12	1331	1244480	2
Beta		22.1	+/-4.05	3.18	1.35	+/-5.10	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	1.77	+/-2.59	4.53	1.82	+/-2.62	6.00	pCi/g		BYS1	09/13/12	2127	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.148	+/-1.30	2.24	1.09	+/-1.30	4.00	pCi/g		TYJ1	09/14/12	0218	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	35.3	(25%-125%)

Notes:

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Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200216
Sample ID: 309955028
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 1.43%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.154	+/-0.0762	0.075			0.100	pCi/g		MXR1	09/18/12	1337	1241406	1
Cobalt-60	U	-0.0103	+/-0.0341	0.0653				pCi/g						
Radium-226		0.657	+/-0.200	0.173				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		12.5	+/-4.34	3.68	1.34	+/-4.97	4.00	pCi/g		DYT1	09/12/12	1332	1244480	2
Beta		19.2	+/-3.53	2.54	1.05	+/-4.42	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	1.73	+/-2.53	4.42	1.78	+/-2.56	6.00	pCi/g		BYS1	09/13/12	2145	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	0.334	+/-1.26	2.16	1.05	+/-1.26	4.00	pCi/g		TYJ1	09/14/12	0320	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	34.5	(25%-125%)

Notes:

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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200217
Sample ID: 309955029
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 1.52%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.182	+/-0.0643	0.0745			0.100	pCi/g		MXR1	09/18/12	1338	1241406	1
Cobalt-60	U	-0.0119	+/-0.0355	0.0652				pCi/g						
Radium-226		0.718	+/-0.179	0.133				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		9.83	+/-3.89	3.25	1.09	+/-4.33	4.00	pCi/g		DYT1	09/12/12	1355	1244480	2
Beta		12.5	+/-4.09	5.46	2.49	+/-4.48	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	-0.298	+/-2.01	4.35	1.75	+/-2.01	6.00	pCi/g		BYS1	09/13/12	2202	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.023	+/-1.21	2.08	1.01	+/-1.21	4.00	pCi/g		TYJ1	09/14/12	0421	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	34.1	(25%-125%)

Notes:

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Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433
Report Date: September 20, 2012
Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200219
Sample ID: 309955031
Matrix: Soil
Collect Date: 12-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 2.8%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.220	+/-0.102	0.0992			0.100	pCi/g		MXR1	09/18/12	1341	1241406	1
Cobalt-60	U	0.0135	+/-0.0619	0.128				pCi/g						
Radium-226		1.05	+/-0.237	0.187				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		23.3	+/-6.50	2.83	0.720	+/-8.37	4.00	pCi/g		DYT1	09/12/12	1408	1244480	2
Beta		35.6	+/-5.17	4.32	1.93	+/-7.22	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	2.10	+/-2.68	4.56	1.84	+/-2.72	6.00	pCi/g		BYS1	09/13/12	2237	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.166	+/-1.45	2.51	1.22	+/-1.45	4.00	pCi/g		TYJ1	09/14/12	0624	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	31.9	(25%-125%)

Notes:

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Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
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Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200185
Sample ID: 309955032
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 5.24%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.403	+/-0.0969	0.075			0.100	pCi/g		MXR1	09/18/12	1341	1241406	1
Cobalt-60	U	-0.0142	+/-0.0329	0.0627				pCi/g						
Radium-226		1.04	+/-0.222	0.137				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		23.2	+/-6.42	3.06	0.854	+/-8.01	4.00	pCi/g		DYT1	09/12/12	1406	1244480	2
Beta		21.4	+/-4.63	5.23	2.37	+/-5.54	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	1.20	+/-2.47	4.54	1.83	+/-2.49	6.00	pCi/g		BYS1	09/13/12	2256	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.381	+/-1.24	2.16	1.05	+/-1.24	4.00	pCi/g		TYJ1	09/14/12	0726	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	36.0	(25%-125%)

Notes:

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Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200186
Sample ID: 309955033
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 7.06%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.171	+/-0.0993	0.128			0.100	pCi/g		MXR1	09/18/12	1342	1241406	1
Cobalt-60	U	0.00966	+/-0.0521	0.114				pCi/g						
Radium-226		0.815	+/-0.283	0.200				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		8.48	+/-3.77	3.02	0.909	+/-4.07	4.00	pCi/g		DYT1	09/12/12	1406	1244480	2
Beta		18.4	+/-4.55	5.45	2.47	+/-5.12	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.277	+/-2.33	4.72	1.90	+/-2.34	6.00	pCi/g		BYS1	09/13/12	2313	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.0541	+/-1.13	1.96	0.954	+/-1.13	4.00	pCi/g		TYJ1	09/14/12	0827	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	33.8	(25%-125%)

Notes:

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Certificate of Analysis

Company : Radiation Laboratories - WPAFB
Address : 2510 Fifth St. Area B
Bldg 0840
Wright Patterson AFB, Ohio 45433

Report Date: September 20, 2012

Contact: Capt. Eric Weatherholt
Project: USAF project - Wright Patterson AFB

Client Sample ID: 11200187
Sample ID: 309955034
Matrix: Soil
Collect Date: 11-JUL-12
Receive Date: 21-AUG-12
Collector: Client
Moisture: 1.67%

Project: BVNA00200
Client ID: BVNA002

Parameter	Qualifier	Result	Uncertainty	DL	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
Gammaspec, Gamma, Solid "Dry Weight Corrected"														
Cesium-137		0.131	+/-0.0708	0.0873			0.100	pCi/g		MXR1	09/18/12	1343	1241406	1
Cobalt-60	U	-0.0186	+/-0.0381	0.0695				pCi/g						
Radium-226		1.16	+/-0.241	0.135				pCi/g						
Rad Gas Flow Proportional Counting														
GFPC, Gross A/B, solid "Dry Weight Corrected"														
Alpha		21.9	+/-5.66	2.58	0.731	+/-7.20	4.00	pCi/g		DYT1	09/12/12	1404	1244480	2
Beta		29.2	+/-4.75	5.02	2.31	+/-6.29	10.0	pCi/g						
Rad Liquid Scintillation Analysis														
LSC, Tritium Dist, Solid "As Received"														
Tritium	U	0.00	+/-2.12	4.41	1.78	+/-2.12	6.00	pCi/g		BYS1	09/13/12	2331	1242251	3
Liquid Scint Ni63, Solid "Dry Weight Corrected"														
Nickel-63	U	-0.986	+/-1.31	2.32	1.13	+/-1.31	4.00	pCi/g		TYJ1	09/14/12	0929	1242226	4

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	DRS1	08/26/12	1310	1241163

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Nickel Carrier	Liquid Scint Ni63, Solid "Dry Weight Corrected"	1242226	32.6	(25%-125%)

Notes: